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PROJECT ACCESS

A Study of Access to Scientific Research, in Cooperation with the Bunting Institute of Radcliffe College

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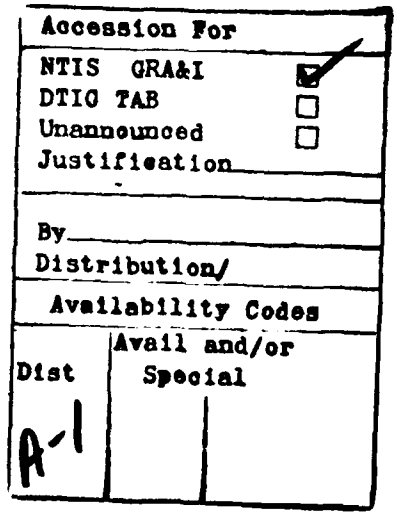
Abstract

Description of rationale, methodology, typical results and remaining problems of a study designed to contribute to the knowledge base required for increasing the participation, particularly of women, in research careers in science, engineering, and mathematics.



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STUDY OF ACCESS OF WOMEN SCIENTISTS AND ENGINEERS TO RESEARCH CAREERS

Introduction. In our original application to ONR of 7 May 1986 we proposed support for a research project to study the access of young women to high-quality scientific research. The primary focus was to be an investigation of the career impact on those young female scientists who have been members of the Bunting Institute at Radcliffe (and its predecessor, the Radcliffe Institute), serving thereby also as a follow-up study of those who had received support from the separate ONR program of the Bunting Institute. In addition, we also noted that if the necessary information were obtainable, we would like to include a comparison of the career impact on young women scientists who have participated in the Navy-sponsored Graduate Fellowships and the Young Investigators Programs. Finally, we proposed to pursue these two studies in the framework of an ongoing investigation of the factors that help determine the productivity of scientists and the qualify of their research output.

As will be demonstrated below, a number of our aims have already been achieved. For example, the data on women scientists who have been Bunting Institute Fellows enlarge our understanding of their careers, and this will permit suggestions how the conditions of future Fellowships might help to maximize the benefits derivable from them.

But it also became evident to us that what was required, even for a full understanding of the fates of the Fellows of the Bunting Institute, was a much expanded project that looked at the career paths of former postdoctoral women scientists from a much larger population. The number of women scientists in the total Bunting Institute sample was relatively small to begin with, and we found it also necessary to disaggregate both by fields and by age cohorts, thereby making the available samples for the relevant subpopulations too small for reliable statistical treatment of many working hypotheses. The same was true also for the group of other Navy-sponsored Fellowships, referred to above.

Hence, as reported previously, we decided to engage on a much more extensive and harder version of the initial project (although without using additional financial support from ONR). That is, we decided to enlarge our career-path study to include not only the originally, relatively small population of post-doctoral women scientists at Bunting, but also every woman scientist in the U.S. who had obtained a postdoctoral fellowship from the National Science Foundation and the National Research Council. Moreover, in order to make necessary comparisons with

the experience of equivalent cohorts of men--which was impossible for the Bunting Institute Fellows, since that program applied only to women--we also included a sufficient number of male scientists from the NSF and NRC programs. In this way, the target population for our study of relative obstacles in career paths increased dramatically, from the initial approximate 200 Bunting Institute Science (Post-PhD) Fellows to approximately 2000 scientists throughout the U.S.

Thus the target populations to be studied by Project Access became the following: all women scientists who were awarded Bunting Fellowships by Radcliffe College between 1961 and 1984; all women scientists who were finalists but who were not awarded Bunting Fellowships between 1961 and 1984; all women and men scientists who were awarded National Research Council Postdoctoral Associateships between 1959 and 1986; all women scientists who were awarded National Science Foundation Postdoctoral Fellowships in the sciences between 1955 and 1985; and appropriate matched samples chosen from the much larger population of men who were awarded National Science Foundation Postdoctoral Fellowships between 1955 and 1985 in the sciences.

As a result of the expansion, we not only came in possession of a unique database that can be used for a variety of studies, but we also faced the need for a more extensive period of work, the more so as we had to innovate at every turn how such a larger study is to be done. (For example, it was even necessary for us, at great expense of time and effort, to establish reliable lists

of current addresses of targeted individuals in order to obtain responses to our questionnaires.) Inevitably it followed that despite the expiration of the ONR contract on 30 June 1989, the actual work will continue (without ONR funding) for about another year. The findings are envisaged to be presented in a book-length monograph. The added burden will however be compensated, in our view, by the far greater applicability of our work to the general national problem of career enhancement for women scientists than would have been yielded by a study centered chiefly on the initial, relatively small population of Bunting Fellows.

I. Objectives of the Study. Over the past decades, justified concern has been increasing better to understand and to remedy the marked under-representation among the nation's working scientists, mathematicians, and engineers (to be abbreviated S/E) of women, minorities, and the disabled. Similar and related problems also exist with the pipeline leading to future S/E placements. The reasons for these concerns range widely, from the argument for equal access per se to the perception that, over the next decade or two, a considerable and possibly dangerous shortfall of the S/E pool may be expected, chiefly on demographic grounds, if hitherto under-represented groups do not increase the yield of working scientists to fill the expected gap. Thus the number of 22-year-old U.S. citizens is projected to drop markedly before the end of the century, requiring by conservative estimates a 25% increase in the yield from both traditional and nontraditional groups just to maintain the current supply level (and indeed more from women, minorities, and the handicapped if current patterns of a relatively declining interest by U.S. males

in S/E doctorates persist).[1]

An intimately related issue is the increasing dependence of the S/E work force on non-U.S. citizens in certain important fields. In comparison with the period 1960-69, for 1980-86 the proportion of U.S. citizens and permanent residents has fallen as follows: in physics, from 85.60 percent to 71.52--equivalent to a 16% decline in the relative proportions; for mathematics, from 85.83% to 66.42% percent, a drop of 23% in the proportions; and in engineering, from 82.71% to 54.31%, equivalent to a 34% drop.[2] Another way of looking at the situation is that the total number of new doctorates per year in the U.S., after roughly doubling between 1965 and 1975, has fallen into a condition of stasis, hovering around 30,000 since 1973, of which about 15,000 are in science and 3,000 in engineering--but with a substantial and increasing number going to foreign nationals. Moreover, on the basis of reasonable demographic projections of the number of U.S. citizens expected to obtain doctorates in the natural sciences

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[1] A large literature exists on the dangers of such a shortfall to the position of the U.S. in science and engineering, to education, and also to productivity growth in U.S. manufacturing. On this last point, see for example Zvi Griliches, "R&D and Productivity: Measurement Issues and Econometric Results," Science 237 (1987), 31-35: he finds "a significant contribution of R&D to productivity growth in the largest U.S. manufacturing corporations with...a larger role for basic research and a smaller one for federally financed R&D expenditures than is implied by their relative importance in total R&D expenditures. The magnitude of the effect of basic research is found to be much larger than thought previously, and rising.

[2] National Science Foundation, Science and Engineering Doctorates: 1960-86 (NSF 88-309) [1988].

and engineering, one may expect a drop from 9,000 in 1986 to 7,000 in 2006 (22% drop). These and other data make it reasonable to state, in the words used as a headline of a recent NSF/SEE news release: "American Scientific and Technological Leadership in Peril."

A good deal of useful quantitative research results is now at hand which tracks the recruitment and early career achievement of the S/E pool, including the traditionally under-represented groups within it. From these data, some general quantitative conclusions can be drawn. On the positive side is the increase in the number and proportion of women in many of the S/E fields. But the rate of this rise is not such that it would make up for the expected shortfall. Moreover, as Dr. Betty M. Vetter has repeatedly warned, the number of women earning doctoral degrees has probably peaked, because women's undergraduate enrollments have been leveling off. In mathematics, the problem is already quite clear, as the number of new women doctorates per year has been virtually constant since 1973, while the rate of recruitment of male mathematicians has dropped to one half.

One obvious strategy for increasing the supply of women for S/E careers is a better understanding, with a view to the removal, of the barriers and dissatisfactions that remain in those career paths. There is a wide range of such obstacles, starting with the fact that women with S/E doctorates are much more likely to remain unemployed than men, and as a group receive

significantly less pay.[3] But a particularly important area of difficulty and visible dissatisfaction, not sufficiently studied, concerns the transition period during graduate study, and again between the end of graduate school and the attainment of some position that represents a start on a professional life as a working scientist or engineer. Here, also, the experience of women is differentially worse than that for men, on the average. It is precisely during that last period that the investment of the individual in her personal effort has become a maximum even while the nation's investment in the individual, in terms of fellowships and other support by institutions, federal subsidy of the career preparation, etc., has also reached a maximum. Yet this appears to be a time of greatest vulnerability. As an editorial in Science (25 March 1988) put it, "The serious differential in participation [in S/E, comparing men and women] occurs at the postdoctoral level....At no stage in the educational process is there an indication that the attrition is caused by lack of academic performance. Attempts to understand the attrition have so far been unsuccessful...."

Against this background, it was one of the chief objectives of the study we proposed to investigate the main barriers in the career paths of women who already have made a substantial commitment to S/E careers by virtue of completing a doctorate. In addition, it is evident that while such a study can bring out the less obvious, specific conditions that can blight the early

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[3] National Science Board, Science Indicators 1985, p.70.

careers, it can also serve to highlight conditions under which women scientists and engineers more easily can overcome barriers. Thus the data and analysis this investigation produces may be hoped to be found useful by others for devising balanced policies that expand the access of women and other under-represented groups to scientific careers.

It will be useful to state here that the total population targeted for this study is of considerable size. It consists of every identifiable woman (U.S. citizen and resident alien) who held a Postdoctoral Fellowship or Associateship in an S/E field for one year or more, awarded either by the National Science Foundation, or by the National Research Council, or by the Bunting Institute at Radcliffe. For each of these, the control group consists of a sample of approximately equal size, drawn respectively from the much larger population of male NSF Postdoctoral Fellows and NRC Associates, and matched by field and year of award.[4] The Bunting Institute group consists of all women scientists who received awards or advanced into the final round of the selection process. It is primarily this group on which we conducted a pilot study in preparation for the much larger one that followed it. We believe we thereby obtained a substantial head start for dealing with many problems, from the

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[4] We are not including programs in which the number of awards to women was too small for statistically meaningful conclusions, such as the NATO Postdoctoral Fellowships, NSF Senior Fellows, Presidential Young Investigator Awards, Navy-sponsored Graduate Fellowships and its Young Investigators Program.

proper design and pretest of questionnaires to methods for obtaining access to the individuals (since their current addresses are difficult to find, many funding agencies not being able to keep track of their former Fellows).

II. Some of the Issues Being Addressed. We believe we are aware of most of the significant recent and ongoing studies, a few of which will be referred to below. We have benefitted from them, and established contact with a number of them to avoid the possibility of duplication. But first and foremost, we see our study as a complementary and possibly unique type of research, owing to three factors. Simply stated, they are as follows:

a) We have been committed not only to provide more quantitative measures of success and failure of groups emerging from the S/E pipeline, but to look carefully at specific qualitative factors associated with success or failure, during the individual's postdoctorate years, but also before and after. (One prominent example is the role of mentorship.)

b) The selection and study of such qualitative factors, and the formation of researchable hypotheses, have been guided by the principal investigator's understanding of the history and sociology of modern science. It is a factor that cannot regularly be involved in the usual type of labor force studies; yet it seems to be the more desirable in this instance as, on the basis of our preliminary study, there appear to be significant epistemological differences between subgroups (e.g., high and low

achievers) in their respective operational definitions of what constitutes "good science," and how its pursuit is linked to reasonable career expectations.

c) We have been able to bring to bear on this study, and particularly on the qualitative aspects, our firsthand experience as a science department faculty member over a period of 4 decades, involving the task of participating in the selection among young scientists and in monitoring the fates of actual science careers observed at close quarters. Again, we feel that such special experience and resulting sensitivities fruitfully supplement and complement the useful studies being pursued in other places, where the chief emphasis may be more on the statistical picture alone.

The possibility that these three factors may be of some use in this study may be illustrated by the following example. The career-path obstacles of particular significance for some women scientists and engineers are numerous and varied (e.g., early distancing from mathematics instruction, unsupportive teachers or peers, conscious and unconscious discrimination on the part of a predominantly male community, family duties which compete for time and energy, difficulty in obtaining sympathetic mentors or access to high-quality research teams, much lower rate of advancement to tenure or major responsibility, etc.). While not all observers agree on the relative importance of each of these potential problems, there is considerable concurrence on some points. One of these often determines promotion and access to

further research opportunities even after a woman has reached the PhD level in S/E. Empirical studies tend to show that on the average women scientists produce significantly fewer publications than do male scientists--a characteristic that can assume great importance when connected with the traditional need for an adequate list of publications in many tenure discussions or other career decisions.[5] This phenomenon certainly must be studied in detail, and for a larger group.

On the basis of our pilot study, one hypothesis that has looked promising is the suggestion that the observed quantitative discrepancy between men and women with respect to publication rates does not necessarily represent a correct assessment of the quality of the corresponding scientific research, as judged by peer evaluation of samples of the publications themselves. In that respect, there seems to be a tendency for some women scientists to publish fewer but less reductionistic and more synthetic research reports. In that case, heavy reliance on bibliometric-statistical data by themselves would not be in the interest of science policy generally or of women scientists in particular.

A brief listing of other aspects worth looking into, in terms of the study of actual scientific publications in a

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[5] See, for example, Jonathan R. Cole and Harriet Zuckerman, "The Productivity Puzzle: Persistence and Change in Patterns of Publication of Men and Women Scientists," Advances in Motivation and Achievement, v. 2 (1984), 217-258, and the very extensive bibliography in that article. See also Jonathan R. Cole and Harriet Zuckerman, "Marriage, Motherhood and Research Performance in Science," Scientific American 255 (1987), 119-125.

specific field, included questions such as the following:

Do highly successful male and female scientists (for which other studies usually tend to show only a small or negligible difference on many scales) also have on the whole the same publication habits, such as splitting a lengthy work into a string of several papers?

Are the differences much more pronounced for scientists in the middle range of achievement (as are differences on other scales)?

Do these groups differ significantly in the generation of and response to controversy, thereby affecting the rate of publication and citation?

Can one quantify the relation between productivity of publication and access to research funds and difference in teaching loads?

Do these groups differ significantly in the selection of research-worthy problems in terms of Alvin Weinberg's "trans-science" criteria (e.g., the usefulness of the expected findings of pure science, for applied science, for engineering, etc.)?

Another, and possibly related, example of the advisability of qualitative study of main events in the career path concerns the role and meaning of "quality group," rankings at important points in the career, such as the assignment of quality group (QG) ranking that has been used in the decision to award graduate fellowships. Typically the QG ranking involves four main criteria (including plan of graduate study) and ranges from QG1

to QG6, with QG1 usually yielding automatically the recommendation for the award of the fellowship, and QG2 (and sometimes also QG3) being open to further selection of awardees.

In important ways, the QG1 ranking for men and women can, on the face of it, be considered a robust and sound way to quantify quality. Thus for QG1 men and women scientists, differences in early career outcomes tend to be nil or small, as indicated in the informative report by Joan Snyder, "Early Career Achievements of National Science Foundation Graduate Fellows, 1967-1976" (Technical Paper, Office of Scientific and Engineering Personnel, National Research Council, 1988). For example, for QG1 men and women, about the same proportion complete their degrees, whereas for QG2 a substantial gender difference in doctorate attainments becomes apparent. Also, the presence of dependents among married women had no effect on the rate of degree completion for QG1. Moreover, the larger gender difference in past decades in the attainment of faculty status by former NSF Graduate Fellows in the early award cohorts has now virtually disappeared.

But there are also some findings that indicate marked differences between young male and female scientists when the QG rankings are applied. These findings suggest that one or more of the factors going into the computation of the QG ranking may be susceptible to a gender difference similar to that noted in the case of comparative publication rates.

Thus, while the gender difference in the rate of the offer of an NSF Graduate Fellowship has become smaller in recent years,

the quality rating of men and women differs in puzzling ways. For the 1967-76 cohort, "among men, 53.9% of the Fellows were QG1....Women Fellows, however, consisted of only 40.5% from QG1," a 13.4 point difference, amounting to a difference of about 25% (p.57). The percentage difference in the proportions attaining QG1 ratings grew to 48% for 1977, though by 1986 it had come down to 40%.

One partial explanation may be, as stated in the report, that for the period 1967 through 1976, "It appears that relatively few highly qualified women applied for Fellowships in this particular program." They might be turning to professional schools, or other federal, state and private sources of funds, for example. But it is also possible that the QG1 and QG2 ratings themselves are not equally appropriate across the board to all men and women scientists.

Along this line, it may be significant (although the numbers given are small) that when we turn to the success rates of former NSF Graduate Fellows competing for NSF Postdoctoral Awards, there has been a striking inversion compared with the results for the cohort of 1967 to 1971. Here, as elsewhere in the aforementioned report, the author indicates that further study would be welcomed. At several points, a comment occurs such as "Emphasis on qualitative investigation would provide detail on contextual factors affecting outcomes....(p.166)," and we found this of course a congenial recommendation. Similarly, our study can help make clearer where women (and men) tend to go after the first

Postdoctoral Fellowship if not into S/E, and why such choices are made.

For a third illustration of areas of our interest, one should refer to the well-known report Postdoctoral Appointments and Disappointments of the NRC (National Academy Press, 1981). It was based on a relatively short and largely quantitative survey instrument (pp.341-344), and while it was enormously useful, it also left a number of questions for further investigation. It also dealt only relatively briefly with the special problem of the careers of women scientists and engineers. The report does, above all, make quite clear the importance of the postdoctoral group in the ecology of science and engineering careers--if only because, in most fields, such a large percentage (typically about 30%) of the total number of men and women in S/E take a postdoctoral appointment within a year after their doctorates. Moreover, the proportion of assistant professors recently hired in major research universities who have held postdoctoral appointments is typically twice as large.

Again, the relative difficulty for women to attain tenured faculty positions is made clear. Thus by 1979, two-thirds of the women graduates of 1972 who had accepted postdoctoral appointments were employed in the academic sector; but only one in seven had tenure, while this was the case for approximately one-third of the men (p.153). Having established that "On the basis of the forgoing results, it is quite apparent that men have been more successful than women in pursuing faculty careers," the

report opines that "From the data available it is not clear what factors have contributed to these findings," and only speculates that the difference in tenure rates might be attributable to women leaving the labor force to start families--contrary to the indication that married women in the 1972 cohort with postdoctoral experience have been somewhat more successful in acquiring tenure than single women. Similarly, while finding that women with postdoctoral experience tend to receive lower salaries, and in general "have not been as successful as men in pursuing careers in science and engineering" (as well as agreeing that in certain cases women Postdoctoral Fellows even found the conditions of their appointment undesirable and counterproductive to their long-range prospects), the conclusion reached there is simply that "some further analysis, beyond the scope of this study, is required to determine the major factors contributing to this situation (p.155)." Here it touches precisely on our own interest in this project. With the kind of much more extended survey instruments, incorporating both quantitative and qualitative investigations, we could indeed hope to make our contribution to these points.

As a fourth and final illustration, we refer to the internal NSF report "Women as a Human Resource" by Phyllis Moen (a draft dated December 14, 1988). In surveying the recent literature, it too notes that "women drop out of their career lines more frequently than men..." or "fail to advance as rapidly as their male colleagues," and urges that one of the most expedient

"points of intervention in the pipeline flow" is at the postgraduate level--both for increasing the S/E pool and for attracting new female recruits to it by virtue of the larger number of "female models and mentors." In fact, however, there is a threat of self-selection favoring the flight into other professions (medicine, business, law), where the perceived career handicaps are thought to be smaller and the inducements larger.

Matters are not helped by the documented tendency for women's self-confidence to be diminished during the period of undergraduate and graduate study. The reasons for it still need to be carefully research. But such factors play an obvious role, as does lower financial support; less access to the most prestigious departments, desirable research assistantships, or prominent mentors; and the greater likelihood for women to interrupt their career plans for family reasons (children as well as geographic dislocation). All these factors continue to exact their toll during and after the postdoctoral phase, resulting--according to one very likely working hypothesis--in documentable "cumulative disadvantage" that acts with higher probability on the careers of women scientists, whereas those of male subjects tend to be more characteristically marked by "cumulative advantage."[6]

As a caution, it should however be added here that each of these statements and hypotheses requires testing not against the

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[6] An extensive bibliography of recent work in this field is part of Dr. Moen's draft report.

aggregate of all men and women scientists but against well-disaggregated subpopulations, e.g., for differences between different scientific/engineering fields, and above all for differences between age cohorts. Thus it has become clear in our research that sometime in the period around 1970-1975 there was a significant tectonic change which makes it dangerous to treat and regard as equals samples of careers started before and after that period. (Even a curve of percentage of professional degrees earned by women in fields ranging from medicine to engineering to architecture all show a marked upturn between 1970 and 1975 that has largely continued.)

III. Description of the Project Activities, and Expected Contribution. The materials under this heading will be presented in partly overlapping stages: A) A brief summary of the main variables being investigated. B) The sequence of main activities. C) Comments on acquisition of our research population and samples.

A. Main variables being investigated. [Note: We attach as Appendix A-1 the complete survey questionnaire we developed for the population of former NSF Postdoctoral Fellows (men and women), (identified as PA-6) and used, with appropriate changes in wording, for former NRC Associates (men and women). We also attach, as Appendix A-2, the first few pages of the questionnaire used for the Bunting Fellows (identified as PA-2), to indicate some of the special questions asked of this group.]

After coding the open and closed questions that are summarized below, an essential additional step was the coding of a number of holistic items deduced from a reading of the whole questionnaire. In the study of former Bunting Institute Fellows that formed the center of attention of our initial application to ONR, the list of holistic items which were developed and tested included the following, among others:

Degree of explicit or implied conflicts or tensions between roles (S/E and family care); degree of explicit or implied conflicts with respect to spouse's career or geographic constraints; degree of self-esteem and self-confidence; indication of fear of risk-taking, or lack of same; indication of preference for nurturing role; explicit or implicit encounters with sex discrimination; degree to which respondent appears to be, or has been, an active and successful scientist/engineer; quality rating of respondent's doctorate department.

The main variables in our expanded project included the following:

Aspects of the fellowship: The degree to which more access was provided to scientific resources than would be available otherwise. Access to collaboration with other scientists in one's field. Professional contacts which led to post-fellowship support. Time for reflection and re-energizing. Larger degree of interaction with women scientists. Larger interaction with scholars who are not scientists. Scientific stimulation in the form of symposia, colloquia, opportunities to present papers. Recognition and affirmation of one's professional status.

Special inquiry regarding respects in which fellowship had additional positive influence on subsequent professional development, and also the possibility of negative influence (e.g., disruption with previous contacts on moving to new fellowship site).

Change of working style in scientific research before, during and after period of fellowship. (For each of these,

indication whether style of work was primarily alone, in collaboration with one or more other scientists, exclusively in sizable teams, etc.).

Role the fellowship had in changing the style of work described above.

Change in fields or subfields while a fellow, with indication of the precise fields and subfields involved, and the role the fellowship played in this transition.

Factors in the past and/or now seriously interfering with one's work as a research scientist at a level commensurate with one's training, ability and desire.

Current involvement to a significant degree in scientific research, and time after fellowship when such research ceased (if it did).

Attractive career opportunities (a) in scientific research, (b) in administrative and other careers, which offered themselves while a fellow, and afterwards; with reasons why they were or were not pursued.

Factors determining the degree of absorption in scientific research projects (for example, intrinsic interest in the subject matter, or the need to get work done and published as a prerequisite for professional success).

The need for prolonged periods of immersion (in time and energy) to give full attention to a research project in this particular field; the degree to which the individual was able to give such intensive attention, during the fellowship and now.

Role models: family members, teachers, and/or other persons; age at which these persons were influential.

Any private theory whether or not there are on the average differences between the way men scientists and women scientists at the same career stages do research on scientific problems; description of these differences, and discussion of some of their causes.

Questions about graduate school: university and department of doctorate (or equivalent degree); highest degree obtained; year of highest degree; numbers of years spent as full-time or part-time student, or non-student between baccalaureate degree and PhD or equivalent; assistantships held during graduate school (research, teaching, other); years during which the assistantships were held.

Effect of assistantships on professional development. Dollar amount of debts incurred up to doctorate. Method of financing doctoral studies (with percentage contributions from such funding sources as family, TA, RA, jobs unrelated to academic work, personal savings, contributions from spouse, student loans, fellowship, and other).

Sources of fellowship funding received (NSF, NIH, NIMH, NDEA, home graduate institutions, private foundations, etc.).

Questions about the principal dissertation adviser: rank, special title or distinction, gender of principal advisor, degree of others in direction of dissertation research who were not the principal dissertation advisor.

Questions about fellowships and other post-doctoral appointments: Title of first postdoctoral fellowship. Year applied for. Dates during which fellowship was held. List of department and institution where research was done on the first NSF post-doctoral fellowship. Affiliations with scientists on the staff of the institution, and their relative rank, gender.

Information about postdoctoral appointments other than the first one; including appointments in government and industrial laboratories.

Reasons for taking postdoctoral appointments, possible prolongation of time one held a postdoctoral appointment, and reasons for it. Importance of fellowship in attaining present position. Extent to which fellowship experience contributed to professional advancement. Number of different mentors during postdoctoral appointments. University research positions held other than faculty or postdoctoral appointments.

Scientific field and subfield (with code numbers) while doing PhD; while an NSF fellow; now or when last in scientific research. Membership of scientific research teams. Characteristics of scientific research teams now associated with.

Questions about current employment: Present employment status; type of organization of employer; name and location of employer; length of time of employment; description of current position (including such details as tenure or no tenure; number of graduate students processed during past years; relative distribution of time in principal employment specified by basic research, applied R&D, classroom teaching, administration/management, consulting, professional service. Sources of current research support. Professional status if not currently a working scientist.

Approximate basic annual salary.

Description of immediate career plans.

Personal data: Year of birth, current citizenship (with year of naturalization, etc.).

Year of birth and gender of siblings. Marital (or similar) status; when reaching PhD; during first postdoctoral appointment; as of January 1, 1988.

Number and years of birth of children. Number of children living with the individual now.

Occupation of spouse (or equivalent), mother, father.

Highest level of education of the last three.

Sex, racial heritage, physical handicaps.

An essay on major factors which significantly influence the path of the scientific career positively and/or negatively, but which could not be deduced from this questionnaire.

Curriculum vitae to be attached.

Bibliography of publications to be attached, with indication of research published prior to receiving the doctorate or equivalent degree, and publications arising directly from the research while started as a fellow.

(On a separate sheet, to be detached; name, preferred title, work address, work phone, home address, home phone, spouse's

title, and (optional) Social Security number).

B. Sequence of main activities.

1. Development, testing, and distribution of questionnaires (e.g., see Appendix A) to every identifiable woman who has held a Bunting Fellowship in Science, was a runner-up for a Bunting Fellowship, or held an NSF Postdoctoral Fellowship or an NRC Associateship in every (non-clinical) S/E field and who agrees to participate, as well as to a sufficient number of men in both of these programs, to yield samples approximately equal to the population of women, matched to field and nearest year of fellowship award. See "Comments on acquisition of our research population and samples," below, for the numbers involved.

Where possible, our questionnaire parallels the form of survey instruments on which a database already exists, e.g., "Survey of Scientists and Engineers" conducted by NRC. The questionnaire we used was prepared through several iterations with the help of a number of distinguished researchers in the field, including Dr. Daniel Yankelovich of Yankelovich, Skelly and White, Dean K. Whitla, Director of the Office of Instructional Research and Evaluation at Harvard, and Dr. Frank Sulloway of the Psychology Department at Harvard.

2. Reminder activity by letter and telephone to increase the yield of respondents, where necessary.

3. Analysis of the data, using standard methods, for both open and closed questions and holistic codings. Arrangements were made with Harvard's Office of Instructional Research and

Evaluation as well as with its Office of Information Technology for the necessary programming, storing of the database in Harvard's mainframe computer, data analysis through SAS to obtain correlation of cross-tabs, etc.

4. During the coding we have identified certain respondents whose answers to open questions show particularly interesting points of view worth following up for a subsequent interview. (For example, we have found in our pilot study that a considerable number of women scientists believe that research and publication styles differ between men and women, and some have apparently well-developed theories about it.) We also obtained peer evaluation of the quality of the published work of selected respondents.

5. On the basis of the first analysis, formation and testing of further hypotheses, additional questionnairing, interviewing, and eventual publication of the resulting monograph.

6. During the course of the project, we began to consult with individual members of an Advisory Committee consisting of Mary I. Bunting (President-emerita, Radcliffe College), Jill K. Conway (President-emerita, Smith College), John E. Dowling (Professor of Biology, Harvard University), Carola Eisenberg, M.D. (Dean for Student Affairs, Harvard Medical School), Nathan Glazer (Professor of Education and Social Structure, Harvard University), Kenneth M. Hoffman (Professor of Mathematics, MIT), Matina Horner (President, Radcliffe College), Lilli S. Hornig (Higher Education Resource Services, Wellesley College), Ellen J.

Langer (Professor of Psychology, Harvard University), Margaret L. A. MacVicar (Dean for Undergraduate Education, MIT), Shirley M. Malcom (Program Head, Office of Opportunities in Science, American Association for Advancement of Science), Elizabeth McKinsey (Director, Bunting Institute), Betty M. Vetter (Executive Director, Commission on Professionals in Science and Technology), and Dean K. Whitla (Director, Office of Instructional Research and Evaluation, Harvard University). We also have not been hesitant about involving and consulting others whose expertise and interests overlap with ours.

C. Comments on acquisition of our research population and samples.

1. Postdoctoral NRC Associates to 1986. In the expanded project, we engaged in extensive negotiations with the NRC, and were successful in having NRC agree to send to all its male and female former NRC Associates (a total of 750 and 300 respectively) a request to participate in our study, and to permit NRC to release the names and addresses to us.

2. NSF Postdoctoral Fellows to 1985. The total population here is approximately 526 women and 3300 men. Again, since current addresses of former Fellows were not directly available, we had the heroic but tedious chore of producing our own list, as we had learned to do in our initial study with Bunting Institute Fellows. In small part, the NSF Postdoctoral Fellow list of addresses is obtainable from the (computer-searchable) listing in

such resources as American Men and Women of Science. But while this is of some use, it makes of course a very biased sample, and we had to obtain the current addresses of the rest of the complete list of all former NSF Postdoctoral Fellows, male and female, by applying to the Alumni Records Offices of the individuals graduate--and where necessary, undergraduate--institution (as supplied to us by NSF, essentially available also from the initial press releases of the awards, but modified by the later identification of declinations and acceptances).

In sum, we ultimately had several hundred women scientists participating in our study and an approximately equal, matched sample of men, representing the total spectrum of fields in the natural sciences, mathematics and engineering, and of various cohorts to allow for rapidly changing conditions over the lifespan of the Fellowship programs. The approximate number of subjects contacted to participate was 1886. The latter number consists of 206 former Bunting Institute Science Fellows and runners-up; 300 NRC former Associates (women); 750 NRC former Associates (men); 187 NSF former Postdoctoral Fellows (women, corrected from the number that had been arrived at from the NSF's own Press Releases); and 443 former NSF Postdoctoral Fellows (men).

* * *

In the forgoing, we indicated some of the expected specific contributions to basic knowledge of career-path barriers and of undervalued career-path opportunities, as well as of demographic

trends and implications for S/E education, that the expanded Project expects to be able to provide. Others will be evident by examining the survey instruments (as for example Appendix A), which are suitable for dealing with problems as diverse as the relative impact on career development of role models, family obligations, debt, quality of degree, quality of institution (using, on the personal advice of Gardner Lindzey, principally the rating of faculty quality of the institution), social status of parents (using A. B. Hollingshead's "Occupational Scale"[7]), and even the possible effect of birth order on field choice. Because of the large size and great diversity of the population studied--including fairly new scientists at one end of the spectrum and others near retirement at the other--our findings should serve to test those obtained by other researchers on much smaller samples (e.g., the Cole-Zuckerman studies; or those by E. Goldstein and H. Schuckman which, as O'Leary and Primack have recently pointed out, largely deal with only the very early stages of the publication record of individuals).

No special effort is being made here to provide a detailed bibliography of all work done in the general field of the study. Much of it exists and is easily accessible, e.g., in the cited NRC 1981 Report, the NSF Science Indicators, the 1988 OSEP report by Joan Snyder, the 1988 NSF Draft Report Women as a Human Resource, and many other NAS/NRC or NSF documents. Beyond that,

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[7] A. B. Hollingshead, "Four Factor Index of Social Status" (Department of Sociology, Yale University, 1975, manuscript).

there is an enormous literature on the qualitative and the quantitative indicators of science.[8]

IV. Information on Bunting Institute Science Fellows.[9] For this part of Project Access, the phases of gathering data and entering them into a computer database have been completed, and the data analysis is well advanced.

Note: The term science, as used by Project Access (and also by the National Science Foundation) includes the following general fields: agriculture, biological sciences, health sciences (excluding clinical), engineering sciences, computer and informational sciences, mathematics, physical sciences, psychology and other social sciences.

A. Method for identifying and selecting individuals in populations connected with the Bunting Institute.

1. Bunting Institute Former Fellows.

Names of former Bunting Science Fellows (fields included in the sciences as defined above) were gathered from the Bunting Institute Former Fellows Records. A first list contained 223 names of former Bunting Fellows. Of these, 38 were excluded for various reasons, mainly because they were in fields not covered

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[8] An extensive annotated bibliography on this subject, including a bibliography on the access of women to participation in scientific research, has been compiled in this office. It is a document of 95 single-spaced pages (to mid 1986), and is available on request.

[9]. This section is largely updated from the December 1988 Status Progress Report.

by our definition of science, or did not have a Ph.D. or were only affiliates. 185 former Bunting Science Fellows were identified to be included in the sample. Current addresses and telephone numbers for 181 former Fellows were verified and updated by telephone calls to each former Fellow.

Both home and work addresses and telephone numbers were supplied by the Office of the Associate Dean for Records, Radcliffe College. If no current telephone number or address for a former Fellow existed in the Bunting Former Fellow records, the alumnae office of the undergraduate institution from which she received her degree was contacted. Alumnae office staff either gave addresses directly to Project Access, or indicated that their office had a current address and would not release the address, but would forward our mail sent to the alumna in care of the alumni office.

The Bunting Institute former Science Fellow group was divided into two samples. A small group of 11 former Science Fellows (now referred to as PA-1) were used as a trial group. Group PA-1 was sent a pilot questionnaire. Group PA-2 included the remainder of the former Bunting Science Fellows, and these 170 individuals were sent a questionnaire (PA-2), revised on the basis of experience with PA-1, and with a cover letter kindly provided by Radcliffe College President Matina Horner, who signed each letter. PA-1 questionnaire was sent to 11 former Science Fellows on February 18, 1987. Six were completed and returned to us.

PA-2 questionnaire was sent to 170 former Science Fellows. After the initial mailing, a follow-up letter was sent to each former Fellow who had not responded. This was followed by another letter to non-respondent Science Fellows.

We obtained a total of 74 responses after these three mailings. Five of the returned filled-in questionnaires had to be excluded since the respondents appeared to be outside the scope of our study, so that the size of the contacted population shrunk from 170 to 165 and the number of responses fell from 74 to 69. Out of these 69 responses we were left with 59 usable questionnaires. Among the 10 other responses, there were 5 letters in which the respondent stated that she did not consider herself to be a scientist (even though her field was included in the NSF list of sciences), and 2 letters with extensive comments and response, in letter form, to the questions in the questionnaire. One respondent returned a blank questionnaire and 2 respondents turned out to be "not applicable" for our study, which reduced our contacted PA-2 population by 2, from 165 to 163.

Project Access staff consulted with Dean Whitla, Director of the Office of Instructional Research and Testing, Harvard University, for additional measures to ensure a higher response rate. Mr. Whitla suggested a direct telephone call (interview) to non-respondents. Kathleen Ganley, Project Access research assistant, telephoned 31 Bunting former Fellows identified as non-respondents for PA-2 mailing. Of the 31 non-respondents

contacted, 27 agreed to be interviewed, one refused to participate and three were "not applicable" by virtue of the fact that the fellowship had been for pre-Ph.D period. This reduced our contacted PA-2 population from 163 to 160. Individuals who were interviewed were asked if they would be willing to complete a shorter version of the original PA-2 questionnaire sent. 27 of the former fellows interviewed agreed to do so. All of these were sent an abbreviated version of questionnaire PA-2 (which we call Mini PA-2).

The abbreviated version differed from the original PA-2 questionnaire in that questions numbered 14 through 16 and 20 through 28 were deleted because they had been asked in the telephone interview. Of the 27 Fellows, interviewed and sent the `Mini PA-2', 11 have returned completed questionnaires to date. 2 Fellows sent back blank questionnaires.

In order to increase the response rate from the subgroup of ONR sponsored Bunting Science Fellows a special request was sent out to all 8 non-responding ONR-sponsored Fellows in the PA-2 group and one non-responding ONR Fellow in the PA-1 group. 9 questionnaires were mailed and followed up with some telephone calls. As a result 3 questionnaires were completed and returned to us. All these questionnaires came from the PA-2 group.

Each respondent was sent a letter of acknowledgment and thank you for returning the questionnaire.

In sum, the total number of respondents associated with the Bunting Institute is as follows:

PA-1 questionnaires returned and completed	6	(11 sent)
PA-1 non-resp. ONR Fellows returned and compl.	0	(1 contct)
PA-2 questionnaires returned and completed	64	(170 sent)
PA-2 quests. returned;respond not applicable	2	
PA-2 quests. returned blank	1	
PA-2 letter response "not a scientist"	5	
PA-2 letter response; extensive comments	2	
PA-2 telephone interviews	27	(31 tried)
PA-2 telephone interviews; n/a or refused	4	
PA-2 Mini questionnaires returned and comp.	11	(27 sent)
PA-2 Mini questionnaires returned blank	2	
PA-2 non-resp. ONR Fellows	3	(8 contct)

The total database in our files for Bunting Institute Former Science Fellows (PA-1/PA-2) contains the following:

PA-1 completed questionnaires	6
PA-2 completed questionnaires	59
PA-2 non-resp. ONR compl. questionnaires	3
PA-2 interview & completed quest.	11
PA-2 interviews only	16
Total number of Fellows (PA-1/PA-2) for whom we have data:	95

The following table summarizes the PA-2 data collection:

Population (PA-2):	164
Contacted population:	160
Usable responses:	89
Response rate (89/160):	55.6%

Note: The ONR-sponsored former Bunting Science Fellows are of course a subgroup of the total Bunting Institute population. In sum, a total of 22 ONR-sponsored Fellows were contacted. From 14 of them, we obtained some form of response. We identified 10 more ONR-sponsored Fellows who could not yet be included in our

study because their appointments were very recent, and hence they are not yet ready for a career-path study.

2. Finalists (Non-Awardees) of Bunting Science Fellowships

This population, referred to as PA-3, included those women scientists who applied for Bunting Fellowships at Radcliffe College, and who were finalists but were not awarded Bunting Fellowships. The individuals to be included in this population were identified through a search of fellowship selection records between 1961 and 1984. This search was facilitated by the Radcliffe College Archivist who arranged for access to the Bunting Rejected Applicant files stored in the Radcliffe College Archives.

To obtain current addresses, first the application folder for each finalist was checked for additional names used (married, maiden, etc.) and for undergraduate and graduate institutions the applicant attended. Alumni offices of the graduate and undergraduate institutions were telephoned (for each Finalist) to obtain current addresses. The procedure was the same used for PA-2 populations.

Seventy-three finalists were identified. Seven of the 73 names were removed because the applicant did not have a Ph.D or equivalent experience. One applicant was removed because she is now deceased. Eight applicants were removed because subsequently each became a Fellow at the Institute. Three names were removed because the applicant was not qualified to be part of the study. These reductions brought the population down to 54. Thirteen

names were listed as "lost" by alumni records office. Forty-one finalists were sent Project Access Questionnaire (PA-3). Of the 41 questionnaires sent, 17 were returned. Two of these had to be excluded because the scientist was mistakenly contacted so that we were left with 15 questionnaires. One of the finalists was found to be deceased. As with the PA-2 population, a follow-up letter was sent to PA-3 individuals who did not respond.

In summary:

Population (PA-3):	51
Contacted population:	35
Usable responses:	15
Response rate (15/35):	42.9%

Combining PA-3 with PA-1 and PA-2, our database of participating Bunting Institute Fellows and Finalists contains the following:

Population (PA-1/PA-2/PA-3):	226
Contacted population:	206
Usable responses:	104
Response rate (104/206):	50.5%

B. Questionnaire. The primary assessment instrument used for all populations is a basic questionnaire developed to gather both quantitative (including demographic information) and qualitative data. The basic questionnaire has developed over time. In its original draft, itself the result of nine iterations after circulation to various advisors and experts, the questionnaire was sent to eleven former Bunting Fellows (PA-1).

This trial questionnaire was assessed in terms of respondents answers to questions. Questions were reevaluated by staff after a review of responses.

Questionnaire PA-1 developed into PA-2 and eventually into PA-3. Questionnaire PA-3, sent to Bunting Fellowship Finalists, was of course amended to use phrases such as `postdoctoral fellow' or `postdoctoral fellowship' instead of `Bunting Fellow' or `Bunting Fellowship.' Otherwise, the format of both questionnaires (PA-2, PA-3) is the same. (A sample of our questionnaire in its final form, PA-6, and the specialized part of the questionnaire used for PA-2, have been attached as Appendix A, as noted.)

C. Data.

1. Gathering of Data

For each population, there are in principle four sets of data per respondent: (1) a sheet with the name and current address of the individual sent the questionnaire; (2) main body of returned questionnaire; (3) respondent's curriculum vitae; and (4) respondent's bibliography.

For population of PA-2, there are interview data for those who did not initially respond to the questionnaire. The interviews were conducted on the telephone with 27 of PA-2s who had not returned the questionnaire. In each telephone interview, questions numbered 14-22 and 78 were asked of respondents. Responses were recorded by hand, as quickly as possible, and every attempt was made to record exact wording used by the

respondent. Telephone interviews were not tape-recorded, with the expectation that more PA-2s would agree to be interviewed. A written record of each interview is stored with PA-2 coding form and these interviews are numerically coded to identify data as interview data. If the `Mini PA-2' was returned after the interview, the record of the interview is stored along with the returned `Mini PA-2.'

All those who were mailed questionnaires were requested to include a CV and bibliography with the returned questionnaire.

A breakdown of response rates for CV and bibliography for PA-2 and PA-3 populations follows.

	# of Respondents	# CV & Bib	# CV Only	Missing CV & Bib
PA-2	72	49	9	14
PA-3	16	13	2	1

2. Processing Data

Questionnaires, along with a letter of introduction, were mailed to individuals in each population from the Project Access office in Jefferson Laboratory, Harvard University. A stamped return-envelope was included with each questionnaire which was sent U.S. Mail, first class. Questionnaires sent overseas were sent first class-air mail.

Questionnaires were returned to the Project Access office. Upon arrival, each questionnaire was stamped with a date of return and assigned a respondent code number, written on the upper-right corner of the first page of the questionnaire. The

information sheet with name and current addresses of respondent was detached and filed. The questionnaire was then coded for both closed-ended questions and open-ended questions (essay responses). Coding for PA-2 and PA-3 is recorded on coding forms. A hard copy of the coding form is filed with each individual questionnaire. The individual respondent file includes hard copies of the returned questionnaire, respondent's CV and bibliography and the coding form.

3. Coding

The coding scheme consists of five parts: (1) administrative information; (2) locator codes (to be explained below); (3) holistic codes; (4) closed-ended codes; and (5) open-ended codes. This coding scheme has been developed in an evolutionary way as we learned from experience.

PA-1 (initial trial) responses were not coded on the questionnaire, but responses were used to develop the questionnaire sent to PA-2 and PA-3.

The coding scheme was first developed to be used for coding both the open-ended and closed-ended responses in the PA-2 questionnaire. A detailed coding scheme for responses to the open-ended questions was developed through reviewing open-ended responses and re-examining our hypotheses behind the initial items of the questionnaire. Trial coding schemes for specific questions were made and then modified so as to control for bias and allow the maximum number of possibilities in each response to be coded. The coding scheme was then modified to maximize

computer analysis of the coded data. The coding scheme was also used to set up a program for the computerization of the database. Lastly, the coding scheme was edited for wording bias and to facilitate succinct reading by the coder.

`Locator' codes were developed so as to identify types of responses repeated throughout a respondent's questionnaire. For example, we identify (locate) all the question (item) numbers in which a particular respondent explicitly mentions conflict or tension between multiple roles as researcher, teacher, spouse, or mother (father). Tnus, we can do a respondent-specific (or cross-population) search for frequency and type of questions in which respondent states role conflict.

Holistic codes were developed to make a general assessment of the individual respondent in terms of the hypotheses to be examined in the research project. For example, we ask the coder to determine if the respondent indicated that child-care conflicts, or conflicted, with research (either in general or in his or her own case).

An example of a holistic code is "Category of Scientist," based on the individual's responses, career path shown in the questionnaire, bibliography, and CV. Initial breakdown of categories of scientists include: (1) active, successful research scientist; (2) active , successful scientist-administrator; (3) Markedly less successful, research-scientist; (4) not now, nor recently a research-scientist; (5) was (1) or (2) but now retired; and (6) none of the above, or cannot tell from response.

The coding scheme was tested for reliability. Two coders, one male and one female, each coded the same 20 of the PA-2 respondents in Reliability Test #1 and an additional 20 respondents for Reliability Test #2. The reliability tests were scored independently by a staff member from the Office of Testing and Research. Reliability testing produced a score of 70% or .84 reliability overall.

All 104 PA-2 and PA-3 respondents have been coded for both `open' and `closed' questions. All 104 questionnaires have been entered into the database.

Respondents were flagged to be interviewed if responses to questions were of particular interest and/or if respondents exemplified a type, such as a Fellow with high promise as a research scientist who dropped out of research scientist pool. Respondents to be interviewed were marked as such in the administrative coding section.

4. Data Entry and Storage

All the data of our 104 usable responses have been entered into our computerized database. The software used is SAS. The data are stored on the harddisks of two NEC Powermate 1 personal computers with 40 MB harddisk capacity each. In addition, the data are stored on floppy disks as a back-up.

Hardcopies of the returned questionnaire and coding form for each questionnaire are kept in steel filing cabinets in Room 355, Jefferson Laboratory, Harvard University, organized in numerical

order by respondent code number within a specific Project Access mailing (e.g. PA-2, PA-3).

V. Data on Other Populations Being Studied.

A. National Research Council Associates (PA-4 and PA-5). Populations PA-4 and PA-5 are women and men, respectively, who received a National Research Council (NRC) Post-doctoral Associateship between 1959 and 1986. Permission to contact these former NRC Associates was gained after lengthy negotiation with the NRC and NRC attorneys. The result of the negotiations was that the NRC would sent letters to the former NRC Associates asking each Associate if she would like to participate in the Project Access study. The former Associates responded directly to the NRC and in turn, the NRC sent to Project Access the names and current addresses of those former Associates who were willing to participate. The same procedure was followed for both the women (PA-4) and the men (PA-5).

Letters were sent by the NRC to all women former NRC Associates at their most current addresses available to the NRC. 112 women responded affirmatively. Project Access sent 112 (PA-4) lengthy questionnaires, similar to those sent to the previously mentioned populations, to NRC former Associates.

85 were completed and returned to us; 1 withdrew, 1 questionnaire was returned by the post office, and we received no response from 25. A follow-up letter along with another copy of the PA-4 questionnaire was sent to the 25 former Associates from whom we have had no response. This increased the number of

responses by 7 so that we now have 92 responses, 18 no-responses, 1 withdrawal and 1 scientist whose address was incorrect. All PA-4 data have been entered into our computerized data base.

The same procedure outlined above for the women NRC former Associates was used to get participants for the male NRC Associate population (referred to as PA-5). These were needed to have a control group. Letters requesting cooperation were sent by the NRC to former male post-doctoral Associates of whom 181 have consented to participate to date (one of whom, however, turned out to be misclassified, being a woman). Of the 180 PA-5 questionnaires sent by Project Access 147 were filled out and returned, 2 were returned blank, and so far we have had no response from 31 scientists. Coding and data-entry have been completed for PA-5.

B. NSF Fellows (PA-6). The last population under study is National Science Foundation Postdoctoral Fellows. The NSF provided Project Access with a database on diskettes which included the following information on all 7,889 awardees from the start of the program in 1952 through 1987: name of postdoctoral program, year of award, name, gender, field, institution and year of bachelor's degree, institution and year of doctoral degree, and whether the award was accepted or declined. We limited our target population to men and women who were reported to us to have accepted Regular Postdoctoral Fellowships (including the National Needs Fellowship, the Mathematics Fellowship, the Plant

Biology Fellowship, and the Environmental Biology Fellowship) up to and including 1985 (excluding men before 1975 since there were 2,176 men in that period compared to 105 women). Our rationale has been to study the whole population of female NSF Fellows as completely as possible and to contact all the women NSF Fellows that could be located. In contrast, we only need a sample of male NSF Fellows to match the female NSF Fellows, owing to the preponderance of men among the NSF Fellows. Since the procedure followed to produce current addresses for these individuals involved contacting the alumni office of their graduate institution, we further eliminated men for whom the NSF database did not provide a graduate institution, and men who were the only graduate in the sample from that Ph.D.-granting institution. These constraints yielded a population size of 991: 298 women and 693 men.

Contacting the graduate institutions has yielded addresses for 646 people. A search of the database American Men and Women of Science yielded 39 additional addresses. One hundred fifty-one individuals are considered "lost" or "no record" or "bad address" by their alumni institution, meaning no current address is available for them through that source. The other 155 in the sample fall into several different categories - women for whom the NSF did not have a graduate institution, men and women whose alumni office was uncooperative, or had no address database on any graduate, or was foreign or otherwise difficult to locate/contact. For 55 of the people for whom addresses were

furnished by the alumni offices, mailings by Project Access have been returned as "undeliverable" by the Post Office. Therefore the final total of people in this subpopulation for whom Project Access has current addresses is 630: 187 women and 443 men.

Project Access has mailed a packet containing questionnaire, cover letter, and stamped return envelope to every man and woman in the PA-6 sample for whom an address became available through the above procedure. A reminder packet was sent six weeks later to everyone who did not reply to the first mailing. We have received replies from 405 people. Thirty-four of these replies were not completed questionnaires, but rather letters which typically explained that the recipient had been awarded an NSF Postdoc but had chosen not to accept it. (Presumably the database provided by the NSF was not completely up-to-date about the accept/decline information.) Thus the total for returned completed PA-6 questionnaires is 371: 100 from women and 271 from men. Both closed- and open-ended responses from the returned NSF questionnaires have been coded and entered into the database.

VI. <u>Some Findings on Bunting Institute Science Postdoctoral Fellows</u>. This section will only indicate examples of findings in three key areas. The first compares the fields and careers of this group with our other groups. The second reports on the former Fellows' own evaluation of their Bunting experience. (This part draws heavily on the written comments that individual Fellows entered on the questionnaire. We find that these comments, although not quantitative data in the traditional

sense, are a valuable source of insight.) The third part presents data about the former Fellows' current employment.

A. Fields of Bunting Fellows. Project Access studies Postdoctoral Fellows in the sciences, as defined by the National Science Foundation. This definition includes social sciences, but excludes humanities. It is instructive to make a comparison of the Bunting Fellows (PA-2) with women scientists who received an NRC Postdoctoral Associateship during 1959 - 1986 (PA-4) and with women scientists who received an NSF Postdoctoral Fellowship between 1952 - 1987 (PA-6f).

There is a clear preponderance of social scientists among the Bunting Fellows (**App. B**). More than half of the Bunting Fellows have been in social science (52.2%). 15.9% of the Fellows have been in biology, and 11.6 % in computer sciences and mathematics. In total, 39.1% of the Bunting Fellows have been in natural sciences, whereas 60.9% of the Bunting Fellows can be considered social scientists (including also some who may be humanists). In contrast, the largest group of female NRC Fellows has been in Physical Sciences (46.2%), while 54.6% of female NSF Fellows have been in Biological Sciences.

We can also consider the Bunting Fellows' fields of Ph.D. (**App. C**). The distribution of the Fellows' Ph.D. fields is, as one may expect, similar to that of the fields of Fellowship. Social sciences predominate also among the Ph.D. fields. (There is some evidence that the Ph.D. field composition of the group of Finalists (PA-3) is markedly different, with a smaller rejection

rate for social scientists.) NRC Fellows again were most prominent in Physical Sciences (45.1%), NSF Fellows predominantly in Biological Sciences (50.0%).

The distribution of the fields in which the former Fellows are working now is similar to the prior distributions (**App. D**). Again, about half of the former Bunting Fellows are in the social sciences. Adding the humanists, this group comprises 59.7% of all Fellows. The largest field within the natural sciences are the biological sciences with 17.9% of the Bunting Fellows. The preponderance of NRC Fellows in Physical Sciences (42.9%) and NSF Fellows in Biological Sciences (48.5%) remained unchanged.

B. Career schedule of Bunting Fellows: Year of birth, doctorate, and Postdoctoral Fellowship

year of	PA2	PA4	PA6f
birth	35.6	47.7	45.3
highest degree	67.6	77.8	73.5
fellowship	74.6	80.5	74.2
difference fellowship-degree	7.0	2.7	0.7

Past Bunting Science Fellows in the Project Access study are, on the average, more than a decade older than female NRC or NSF Fellows. They also received their doctorates earlier, on the average, than the Fellows of the other agencies. Most of the Bunting Fellows in our sample received their Ph.D.'s in the 1970's (40.9%) and 1960's (33.8%)(**App. E**). The NRC and NSF groups received their doctorates at a later time, on the average.

53.5% of the Bunting Fellows, but only 12.0% of the NRC Fellows and 31% the NSF Fellows got their Ph.D.s prior to 1970. The average year of fellowship of the Bunting Fellows (74.6) is similar to the NSF group (74.2) and earlier than the NRC group (80.5%)(App. F, G).

A significant finding is that the interval between receiving the doctorate and the Postdoctoral Fellowship is much longer for the Bunting Science Fellows (7.0 years) than for female NRC Fellows (2.7 years) or NSF Fellows (0.7 years). Thus, while the female NSF Fellows are more than ten years younger, on the average, and received their doctorates about six years later than the Bunting Fellows, on the average, they have "caught up" with the Bunting Fellows in terms of attaining a fellowship.

C. The Bunting Experience. Asked whether the postdoctoral fellowship enabled them to attain their present jobs, 60.9% of the Bunting Fellows wrote that the fellowship was either essential or helpful. Among the NRC Fellows the proportion was 74.7%; among the NSF Fellows it was 66.7%.

Answering a more general question about the contribution of the Postdoctoral Fellowship to their professional advancement, almost everybody had a positive opinion about their Postdoctoral Fellowships. Only 5.9% of the Bunting Fellows, 8.8% of the NRC Associates and 4.0% of the NSF Fellows felt that their Postdoctoral Fellowship was not useful. The former Fellows' evaluation of several aspects of their Fellowships can be deduced from the lengthy questionnaires. In what follows note that the

questionnaire sent to the Bunting fellows covered several aspects that were particular to the Bunting Fellowship, while other questions to the Bunting fellows were repeated in the questionnaires sent to the other groups.

D. Bunting-specific questions. On the following Bunting-specific questions, the respondents rated the impact of an aspect of the Fellowship on their professional development and on their personal growth. Each item provided space for comments. Bunting Fellows provided a wealth of additional comments, which can supply valuable insights.

Interdisciplinary Variety

The statement read: "The Institute's fellows represent a wide variety of disciplines in the arts, humanities, and sciences." The largest group the former Bunting Fellows saw no impact of interdisciplinary variety on their professional development (35.9%). But 62.6% reported a somewhat positive or very positive impact. The influence of interdisciplinary variety on personal growth was valued more positively. 81.1% experienced a positive impact of variety on personal growth, whereas 10.9% noted no impact. The comments echo the opinion that the interdisciplinary setting at Bunting was even more valuable as a personal than as a professional experience. "None of us ever fully realizes the impact of the growing interdisciplinary isolation within contemporary universities until the opportunity for regular interaction across disciplines is savored. I particularly enjoyed the contact with physical

scientists/mathematicians and with visual artists." (Q1,ID501). Several other Bunting Fellows made similar statements (Q1,ID34;ID46;ID53;ID55;ID91;1D168).

Some scientists explicitly made the point that the professional benefits were limited during their tenure. "You do not make contacts at Bunting that are as useful professionally as other institutes with which I have been affiliated." (Q1,ID47 cf.ID126). However, it should be noted that in recent years a program has been instituted by which each Bunting Science Fellow is associated with a laboratory or department in Boston area universities.

Sometimes the synthesis of field heterogeneity and gender homogeneity results in a boost of gender identity. Two Fellows reported the exhilaration they felt at the orientation meeting. Interdisciplinary diversity among women is experienced as the foundation on which to build a confident gender identity. "It was almost with awe that I realized during orientation the depth and breadth of women's abilities, skills, and knowledge - both humbling and encouraging." (Q1,ID141;ID164).

Of course, given the small numbers of Bunting Fellows, the flip-side of diversity is the lack of colleagues in one's own field. "My professional development would have benefitted from more exposure to people in my own field." (Q1,ID126) "There were no fellows at the Institute in my field during my time there; thus "no impact" on my professional development. ..."(Q1,ID53). For some Fellows, the wider academic community at Harvard

provided the opportunity to go outside the Bunting Institute for professional interaction. "Effect was more personal than professional; for specialist colleagues in my research field I drew upon the relevant departments at Harvard." (Q1,ID45, Q5,ID79) But others lacked this opportunity: "... Very isolated from Harvard Anthro. Dept. - although my Ph.D. was from there." (Q5,ID106).

All-female environment

The second questionnaire item was "All the Institute's fellows are women." 64.5% of the Fellows saw a positive impact on their professional development and 74.6% a positive impact on their personal development. Almost all the comments expressed positive feelings. The Bunting Institute was seen as a very supportive environment (Q2,ID67;ID78). As one woman put it with a self-ironic twist: "It was a bit of a mutual admiration society - but that is what I needed. ..." (Q2,ID79). Some responses asserted that women needed a sheltered, supportive environment before they could succeed in the "outside" male-dominated work domain. This idea reiterates one of the main arguments of the supporters of women's colleges. "I was at the Institute for several years beyond my fellowship. I eventually felt I had to test myself in an environment with men but the all-women environment was an essential precursor to that step." (Q2,ID69). "I am not sure that this kind of protection is good for any disadvantaged group. However, I am aware that some women and girls need to be buffered before they face competition."

(Q22,ID94). Another woman affirmed the all-female milieu not as a temporary catalyst, but as permanent, and preferred, environment. "I am fortunate to come from an institution with a strong academic women's studies program and to have a strong group of women colleagues so it is inconceivable to me to attempt my work in any less feminist and female an environment. ..." (Q2,ID501).

An interesting byproduct was the occasional discovery by Science Fellows of "misconceptions about science & technology among some non-scientists." (Q1.ID148). This comment is probably directed toward those Fellows who hold radically feminist theories about science. For some women who have been doing science, it may have been hard to deal with some women who theorize about science. On the other hand, this exposure to strange concepts can be experienced as a positive learning experience, increasing awareness.

Local residence

The residence item ("The Institute requires that fellows reside in the Boston area.") received the lowest average ratings of all the Bunting questions, although the average rating was still between "no impact" and "somewhat positive." 10.3% of the Fellows reported a "very negative" or "somewhat negative" impact on their professional development, 8.6% noted a negative influence on personal growth. The large number of those who checked "no impact" (professional: 53.4%; personal: 46.6%) appears to consist mainly of prior residents in the Boston area,

as a series of comments indicates (Q3,ID29;ID41;ID59;ID69; ID70;ID78;ID81;ID126;ID158;ID161;ID163;ID601;ID607). Given the disciplinary diversity of the Fellows, it is not surprising that some women emphasized the more personal aspect of community-building through the Fellows' living together. "Clearly, to provide interaction and development on a personal level, this is mandatory. One or two persons in my time were based elsewhere but came in for occasional visits. There was no way to develop relationships with them." (Q3,ID502). "... It's hard to create a community without some period of proximity." (Q3,ID100) On the other hand, outside pressures, chiefly from family commitments, appear occasionally as obstacles to residence in the Bunting community. The Fellowship put a strain on family relationships in some cases. "I had to split from my husband and children. It took nearly a year to heal the breach. The consequences were nearly disastrous! But I did get a book written and tenure soon followed!" (Q3,ID45) Whereas this woman was able to resolve the family crisis brought about by her Fellowship, another woman wrote: "Husband resented; used as excuse for divorce." (Q3,ID51).

Two fellows expressed gratitude for the liberal interpretation of the residence requirement in their cases (Q3,ID18;ID36). But some prior Boston area residents who find it easiest to comply with the residence requirement are likely to be somewhat less interested in the community aspect of the Bunting Fellowship. They may not participate in the Bunting community to

a full extent, since they maintain their prior commitments to family, friends and colleagues in this area, whereas those who move to Boston to become Bunting Fellows are, of course, more strongly focused on the Bunting Institute. "There is still a gap between those with family and other commitments in Boston area and those more free to have exchanges with colleagues at the Institute." (Q3,ID141). "... Those who had taken up residence were more available for both personal and professional activities & discussion. Those from Boston (i.e. did not move) were also less available." (Q3,ID603).

E. General questions. The other questions about the fellowship experience were posed to NRC and NSF Fellows, as well as to Bunting Fellows). Here, it is possible to compare the Bunting Fellowship to these other Fellowships. The first two of the general questions followed the same format as the Bunting questions. The other general questions had a true/false choice.

Free time for research

This item was: "While Fellows, scientists spend more time on a particular research project (or projects) than they would have done otherwise."

The opportunity to pursue research relatively free from external restraints is of course a valued aspect of all Fellowships under consideration. With the choices being "largely positive", "somewhat positive", "neutral", and "somewhat negative", the average rating in all cases is "somewhat positive" or higher. The Bunting Fellows gave slightly higher ratings, on

the average, than the NRC and NSF Fellows. As one might expect, all Fellowship groups rate the impact on professional development higher than the impact on personal development.

The Bunting Fellows' comments generally convey the idea that the Fellowship helped their research by providing free time. "The Bunting arrived for me at a particularly important intellectual and personal cross-roads. I had largely lost the opportunity to engage in intensive research and writing, if only through the inroads of small academic and personal commitments, so welcomed the chance to reimmerse myself without competing demands." (Q4,ID501).

Affiliation with senior scientists

Until fairly recently, the Bunting Institute did not normally mediate to produce a formalized affiliation with a senior scientist, in contrast to the other Fellowships. This question about affiliation may therefore not be comparable across Fellowships (App. H, I).

The average ratings of the impact of affiliation with a senior scientist are positive for all groups, but markedly lower than those for the impact of free research time. Again, the impact on personal growth is consistently rated lower than the impact on professional development.

Bunting Fellows seemed to appreciate their collaboration with senior scientists. "To be back at the Harvard [name] Dept. and to work with [name] and learn the new ideas and techniques was wonderful." (Q5,ID79). There were also negative experiences.

"I did not have such a formal affiliation, although I did get to meet many of the scholars at Harvard in my field. I felt that these men were arrogant, indifferent and callous toward me (with the exception of 2 individuals who were very friendly and helpful). Their general attitude was confirmed when one member of this department admitted that they had treated me "shabbily" (his word) - this was shortly before I left." (Q5,ID604). Many of the commenting Bunting Fellows, however, noted that they were not affiliated with a senior scientist, but that they thought an affiliation would have had a positive impact. "This was not true of my Bunting Fellowship. I think it would have had a positive impact." (Q5,ID120, cf. ID126;ID163;ID168;ID609).

Influences on career development

The other general questions were those with true/false responses. Some of them show marked differences between the Bunting Fellows and the other Postdoctoral Fellows.

Only one half of the Bunting Fellows (49.2%), as compared to three quarters of the NRC (76.1%) or NSF (77.8%) Fellows said that their Fellowship provided more access to scientific resources. This result may be partly due to the preponderance of social scientists among the Bunting Fellows.

The interdisciplinary diversity of the Bunting Fellowship is reflected in the fact that almost every Bunting Fellow (96.7%) affirmed that the Fellowship facilitated interaction with non-science scholars, while only 14.1% of the NRC and 22.7% of the NSF Fellows gave that response.

Considerably more Bunting Fellows (66.7%) than NRC (23.9%) and NSF (22.9%) Fellows said that the Fellowship made available interactions with other women scientists. Those Bunting Fellows who responded "false" have presumably done so because there were no other scientists of their discipline at the Bunting. "Effect is less dramatic than might be expected because of broad range of fields represented. Most other science fellows not really "colleagues" at the time I was at the Institute." (Q7,ID505, cf.ID34;ID46).

The statement that the fellowship leads to useful professional contacts was supported by 55.6% of the Bunting Fellows, 72.8% of the NRC and 61.2% of the NSF Fellows. On the other hand. almost all Bunting Fellows (96.8%), but only 63.3% of the NRC and 62.9% of the NSF Fellows agreed that the fellowship provided time for re-energizing. About two thirds of all three groups said that the Fellowship exposed them to scientific stimulation in the form of symposia, colloquia, etc. (Bunting: 63.5%, NRC: 65.2%. NSF 65.7%). 90.3% of Bunting Fellows and 87.9% of NSF Fellows, but only 74.4% of the NRC Fellows said that the Fellowship provided recognition and affirmation of their professional status.

F. Synopsis. This section reviews the Bunting Fellows' responses on the items with "impact" ratings.

All the dimensions of the Bunting Fellowship had positive ratings, which indicates that the former Bunting Fellows look back to their Bunting experience in a favorable--if not

nostalgic--way. The professional impact of free time to do research received the highest average rating, while the professional impact of local residence received the lowest average rating, which is still slightly positive. The most problematic of the items is certainly the local residence requirement. It received the lowest ratings, and as could be seen from the comments of Bunting Fellows, created hardship in individual cases. However, the same may well be true for any Fellowship that is associated with a geographic center, no matter where that center may be located.

As one might expect, the items referring to the interdisciplinary variety and the all-female environment at the Bunting Institute have slightly higher ratings on the personal dimension than on the professional dimension. In contrast, the professional rating is higher than the personal rating on the items more directly related to professional activity (free time for research, and affiliation with senior scientists).

G. Current position of former Bunting Fellows. This section presents some findings about the current position of the former Fellows.[10]

Former Bunting Fellows have the lowest percentage of full-time employees among the three Fellowship groups (**App. J**). 63.5% of the former Bunting fellows are in full-time employment, as compared to 82.6% of the NRC and 74.8% of the NSF Fellows.

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10. Current employment means January 1987 for the Bunting and N Fellows and January 1988 for the NSF Fellows, which reflects the late date of the NSF questionnaire mailing.

Bunting Fellows, on the other hand, have the highest percentage of part-time employees (10.8%) and "other" (10.8%). In all three groups, roughly 10% of the Fellows hold full-time or part-time postdoctoral appointments (Bunting: 10.8%, NRC: 9.8%, NSF: 12.1%).

Of the working Bunting Fellows, 69.6% are at a university or four-year college (**App. K**). The Bunting percentage is slightly higher than the NSF percentage (62.5%). If we add those Fellows employed by Medical Schools, we again find slightly more Bunting Fellows (76.8%) than NSF Fellows (75.0%). In a marked contrast with these two groups, only 30.8% (35.2%, including Medical Schools) of the former NRC Fellows currently work in a university setting. A great number of NRC Fellows went to work with the Federal Government (41.8%), compared to small minorities of Bunting (2.9%) and NSF (6.3%) Fellows. Fewer Bunting Fellows (2.9%) than NRC (13.2%) or NSF (12.5%) work in industry. 7.3% of the Bunting Fellows are self-employed, which is the highest percentage of the three groups (NRC: 0.0%, NSF: 2.1%).

Of those former Fellows who work at a university, 85.7% of the Bunting Fellows have faculty status, compared to 70.7% of the NRC and 72.0% of the NSF Fellows (**App. L**). The higher proportion of faculty among the Bunting Fellows is probably due to the fact that the Bunting Fellows, on the average, obtained their doctorates earlier than NRC and NSF Fellows.

The earlier start of the Bunting Fellows's academic careers is also reflected in their faculty positions. 44.0% of the

former Bunting Fellows are full professors, whereas only 22.6% of the former NRC and 28.1% of the former NSF Fellows have reached this position (**App. M**). The bulk of the former NSF Fellows are associate professors (43.8%), the majority of former NRC Fellows are assistant professors (54.8%). The data about tenure are consistent with this difference in ranks. 69.2% of the Bunting Fellows have tenure, compared to 56.0% of the NSF and only 26.2% of the NRC Fellows (**App. N**).

H. Citizenship of Bunting Fellows. Information about citizenship is available for 68 of the 89 Bunting Fellows. Of the 68 Fellows, 52 (76.5%) were U.S. citizens by birth, 9 (13.2%) U.S. citizens by naturalization, five (7.4%) permanent residents of foreign citizenship, and two (2.9%) temporary residents.

As to the naturalized U.S. citizens, we examined whether they were already citizens at the time of their Fellowship or were naturalized after their Fellowship. Two of the nine naturalized citizens did not note their year of naturalization. Of the remaining seven Fellows, four were naturalized in the same year or after their Fellowship. These four Fellows came to the Bunting Institute as foreigners and subsequently became American citizens. In these cases, Fellowship support for non-nationals may have facilitated their stay in the U.S. and naturalization, and contributed to a successful "importation" of foreign scientific talent. (An additional benefit is the more international composition of the cohort.)

A similar argument can be made for the foreign Fellows. Whereas the two temporary residents have returned to foreign countries, all four permanent residents for whom addresses are available still reside in the U.S. and work in American academic institutions.

Of the 11 known foreigners who applied for a Bunting Fellowship, only two left the country, four became citizens, four are permanent residents with known American addresses, and one is a permanent resident whose address is unknown.

VII. Some Findings on Quality Rating.

A. Results of a peer-review pilot project. One of the most important variables in our study is the quality of the individual's scientific work. This is of course extremely difficult to measure in a reliable way, even though judgments about it are crucial throughout the career--including at the competition for the award of the Postdoctoral Fellowship, and various key calibration points on the way to appointments as research scientist. While in the past occasionally experiments have been made to quantify such quality ratings (e.g. by Conyers Herring), we have had to mount a separate sub-project to design and test a way of obtaining quality ratings by peer review that would be suitable for our purposes. (For example, we need to know how the "quality" of individuals relates to their rates of actual advancement to tenure or to "dropping out.") We obtained the cooperation of four distinguished professors of biology to be

raters, and submitted to each of them dossiers on a group of evaluees consisting of 24 former NSF Postdoctoral Fellows in biology. The raters first worked separately and then all met together with Project Access staff for comparison of and discussion about the individual ratings, as well as about improvements in the research design for future large-scale forms of this pilot project.

Quality assessment for each individual was done in two ways by each rater. First, each rater was to study the curriculum vitae and bibliography of each evaluee, indicate if the evaluee happened to be personally known, and decide whether the evaluee was either a "reasonably successful scientist" or "markedly less so", as well as in basic or in applied science (or neither). Then the quality rating was repeated, this time by considering also the reprints of the evaluee's scientific research publications, which we had previously obtained. (Each evaluee was asked to identify his or her three most important publications.) Finally each rater sorted the 24 evaluees into 3 quality groups (A, B, C) of roughly equal size. Apart from the four biology professors, staff members of Project Access who are scientists but not biologists attempted to go through the same sequence, so as to see how close or far from the consensus of the trained biologists they would come.

The pilot project yielded some important guides for improvement of the process. The distinction underlying the first quality assessment ("reasonably successful scientist" vs.

"markedly less so") was not very useful because it hardly discriminated between the biologists in our particular sample. Almost all of the evaluees were classified as "reasonably successful scientists." As to the second type of quality assessment (Groups A, B, and C), the raters did not make groups of roughly equal size. Group sizes varied considerably both for a given rater and between the raters. In the discussion with the raters it appeared that raters found it easier to apply absolute (quasi-external) quality standard rather than the relative standard for which we had asked. Moreover, raters liked to use intermediate evaluations, such as A-, B+, or A/B.

The raters' approach to quality group rating suggested that we treat the quality groupings as absolute quality scores. The quality scores were standardized (mean=0; standard deviation=1) to obtain a more adequate basis for comparing and averaging.

Findings

a. Correlation between raters is only moderate. The Pearson correlation coefficients between the raters range from 0.73 (H.-B.) to 0.17 (L.-E.). The Spearman and Kendall Tau b correlation coefficients (considering the rank of the biologists) are very similar.

b. Prior familiarity with the evaluee did not seem to effect quality rating. Two raters gave familiar biologists higher scores, on the average, than they gave to those biologists whom they did not know beforehand. The opposite was true for another rater. The forth rater did not know any of the evaluees.

c. Biologists who are considered to work in "applied research" may receive lower quality ratings than those in "basic research." All three raters who had biologists in the applied research category gave them lower scores, on average, than they gave the basic researchers. Owing to the small numbers of applied researchers involved, none of the differences is significant.

d. High quality scores are scarce for younger biologists. For each rater, as well as for the average score, there is a negative trend indicating lower scores for younger biologists. None of these trends reaches significance level, however. In particular, the raters seemed reluctant to give high grades to young biologists, but less reluctant to give them low grades.

e. Raters agree more on high quality ratings than on low quality ratings. Raters showed stronger agreement on the top half of the evaluees than on the bottom half.

For future use, the evaluation procedure is therefore being modified in several points. The relative quality rating (groups A, B, C) is replaced by an absolute quality rating. The existing absolute rating ("reasonably successful scientist" vs. "markedly less so") is replaced by a more finely graded rating scale (NSF style), allowing the choice of decimal numbers on the rating scale.

Example:

Rate the "quality of scientist" (as of now or up to the point of dropping out of science) on the basis of this person's CV and bibliography only. Use a rating scale from 1 to 5. You may use decimal numbers, such as 4.5 or 3.33.

1	2	3	4	5
poor	fair	good	very good	excellent

Quality rating: ____

The general consensus among our raters was that the painfully acquired reprints in the dossiers were of quite limited value and could well be omitted. At most, abstracts of a few key papers or even a copy of the first pages of some reprints would be desired. We are encouraged to include a question on Career Trajectory, distinguishing between 6 types of scientific careers.

Types of Career Trajectories:

Type I: The consistently successful scientist--consistently among top third of American scientists.

Type II: The consistently less successful scientist--consistently among middle third of American scientists.

Type III: The consistently marginal scientist--consistently among bottom third of American scientists.

Type IV: The late bloomer--starts as type II or III, but turns into type I.

Type V: The disappointment--starts as type I, but turns into type II or III.

Type VI: The fluctuating scientist--repeated ups and downs.

We also perceived from our rating experiment that there exists a credible possibility that we can arrive at an algorithm that would produce a defensible quality rating based on the

following factors that revealed themselves during the expert raters' work and discussions:

General factors

- Present position: academic rank (relative to stage in evaluee's career), and reputation of university or department (for which published quality ratings exist).
- Prestige of journals in which evaluee had published (e.g. as measured by I.S.I.).
- Quantity of publications: Length of papers was found to be rather unimportant. Gaps in publication record were acceptable in early career stages.
- Characteristics of research field: e.g. "hot" vs. "off-beat."

Specialty-specific factors

- Prestige of laboratory (laboratory director).
- Publications: The lack of first authorship is not necessarily a negative factor. In certain fields, a dearth of first authorships may be evaluated positively: The evaluee is seen as a successful lab director whose name is put last in these fields.

Other factors

- Prestige of Graduate School.
- Prestige of thesis advisor.
- GRE scores.

We obtained the cooperation of the NSF (without revealing to each other both the names of a specific individual and his or her quality rating by ourselves or, previously, by NSF) to share with us sufficient information about the Quality Groups our evaluees

had when they were actually awarded the NSF Postdoctoral Fellowships. In this way we could test how well these ("original") quality ratings have stood up when compared with the quality ratings at the current stage of their respective careers. Although the numbers involved are not large enough for statistically sophisticated analysis, we did note that those with the lowest quality ratings in our experiment had received the lowest original NSF Quality Group ratings. Other than that, no effect was discernible.

VIII. Scientific Activity of Non-Respondents. One obvious problem for us, as for all such projects, is the existence of a substantial group of non-respondents, despite our unusually persistent efforts aiming at full participation. To what degree have non-responses resulted in a biased sample? For instance, do non-respondents chiefly consist of "drop-outs", whose experience of career obstacles should be of great interest to us? Or of the best and busiest scientists? To get an indication, we undertook a special sub-project to determine the publication activities of 54 male and 42 female PA-6 biologists who were sent questionnaires but who did not respond (nor were the mailings to them returned to us as undeliverable) and whose publications (from 1978 on) one would expect to find in BioAbstracts to 1989. To put it in a nutshell, the data show only a slight tendency for a preponderance of high-producing males among our non-respondents. We also noted that women were 1.68 times more

likely than men to appear among those non-respondents who did "drop out", in the sense that no scientific publications were found after 1986--yet another indication of the unequal rates of retention in the S/E pool.

IX. Database of Open-ended Responses. Project Access has completed the coding of responses to open-ended questions in our questionnaire. The open-ended questions were answered by most of the participating scientists, but not all scientists answered all questions. In addition to coding, the open-ended responses were typed into our computerized database. The following may serve to illustrate only a few of the many kinds of analyses that are now possible. For this illustration we will use some of the responses to questions about differences between male and female scientists and about career obstacles as examples.

A. Differences between male and female scientists. The question read: "Do you believe, on the basis of your observation, that there are on the average differences between the way women scientists and men scientists at the same career stages do research on scientific problems (e.g. style of work, interests, type of problems selected, the rate of publication, quality of publication)? If so, what are these differences, and what may be some of their causes?"

Responses to this question were coded in different ways. The first variable indicates whether the respondent believed in gender differences or not. A frequency distribution of this

variable by sub-population is presented below (PA-2: Bunting Fellows; PA-3: Bunting Finalists; PA-4: Female NRC Associates; PA-5: Male NRC Associates; PA-6f: Female NSF Fellows; PA-6m: Male NSF Fellows). Percentages were calculated in reference to the total number (N) of those in a subpopulation who responded to the question.

	PA-2	PA-3	PA-4	PA-5	PA-6f	PA-6m
Yes	25 (44.6%)	10 (71.4%)	46 (11.5%)	22 (51.1%)	43 (44.3%)	57 (23.7%)
No	13 (23.2%)	3 (21.4%)	29 (32.2%)	82 (62.6%)	39 (40.2%)	127 (52.7%)
Insig. diff.	8 (14.3%)	0	8 (8.9%)	6 (4.6%)	7 (7.2%)	13 (5.4%)
Other	10 (17.9%)	1 (7.1%)	7 (7.8%)	21 (16.0%)	8 (8.3%)	44 (18.3%)
N	56	14	90	131	97	241

A marked gender difference in the responses is obvious. In all women samples, the "yes" category outnumbers the "no" category. In contrast, strong majorities of men NRC Associates as well as NSF Fellows do not believe in gender differences.

The second variable was designed to differentiate among the responses that asserted gender differences. We found that those responses could be coded in eight categories:

- 21: Women have to be better than men in comparable positions. Women have it harder.
- 22: Women are less aggressive, or confident, or take fewer risks.
- 23: Women are more thorough, give attention to details.
- 24: Women and men choose different problems.
- 25: Women publish less.
- 26: Women have different career timetable or career goals.

- 27: Other.
- 28: Women are less visible - being few.

Because the open-ended responses were entered into our database, they can be sorted by code (as well as by a series of other variables) to facilitate thematic display and interpretation. The following quotes--some excerpted from much longer answers-- from former Bunting Fellows (PA-2) were selected from the large amount available to represent the codes and give a flavor of the material Project Access generated.

- 21: **Women have to be better than men in comparable positions. Women have it harder.**
"... One thing is certain, the mediocre male PhD always seems to be with us. There are not too many mediocre female PhD's about. Certainly the latter do not progress very far. The same cannot be said for males unfortunately."(ID504)

- 22: **Women are less aggressive, or confident, or take fewer risks.**
"The women scientists I observed at the Bunting tended to be thorough in their work but somehow <u>less</u> aggressive than men. They all had problems being accepted by their own departments." (ID108)

- 23: **Women are more thorough, give attention to details.**
Women tend to be "more perfectionist, and therefore often turn out fewer but better publications."(ID69)

- 24: **Women and men choose different problems.**
"... within the field of oceanography, there are many more female biological oceanographers than female physical oceanographers. The difference may lie in the amount of math that is required in these disciplines (more in physical oceanography), but it strikes me that other reasons why females find biological subjects more attractive have to do with a nurturing instinct."(ID11)

- 25: **Women publish less.**
"On average, women publish less because their standards are higher, both in the quality of the research and the quality of the writing. Many women in math tend to downplay the quality of their results, either holding on to them too long or submitting them to a less prestigious journal."(ID67)

- 26: Women have different career timetable or career goals.
"... In a university, where the 3 responsibilities are A. Research, B. Teaching, C. Service to the institution and the community, the emphasis as a function of time (or age) is typically: For men A --> B --> C. For women B --> C --> A with adverse consequences for fast promotion. Possible reasons: Career advancement is based on A. Men who support families are motivated or pressurized to advance fast. Women who raise families fit easily into B and C (the skills involved are xxxx [unreadable] to those involved in family raising) but the focus and energy necessary for A are not available 'til later in life when offspring are grown."(ID59)

- 28: Women are less visible - being few.
"Yes. In my field, mathematics, communication of ideas and resultsplays a big role. It is more difficult for women because there are so few of us. ..."(ID149)

The following table shows the distribution of codes in our different samples. Multiple codes were possible so that the sum of percentages usually exceeds 100%.

	PA-2	PA-3	PA-4	PA-5	PA-6f	PA-6m
21	5 (18.5%)	0	7 (11.5%)	3 (8.3%)	7 (14.0%)	6 (9.8%)
22	6 (22.2%)	5 (41.7%)	30 (49.2%)	3 (8.3%)	12 (24.0%)	20 (32.8%)
23	2 (7.4%)	2 (16.7%)	11 (18.0%)	3 (8.3%)	6 (12.0%)	2 (3.3%)
24	10 (37.0%)	1 (8.3%)	18 (29.5%)	9 (25.0%)	9 (18.0%)	13 (21.3%)
25	12 (44.4%)	4 (33.3%)	18 (29.5%)	0	13 (26.0%)	3 (4.9%)
26	4 (14.8%)	3 (25.0%)	11 (18.0%)	3 (8.3%)	10 (20.0%)	8 (13.1%)
27	5 (18.5%)	2 (16.7%)	12 (19.7%)	17 (47.2%)	15 (30.0%)	18 (29.5%)
28	2 (7.4%)	1 (8.3%)	0	9 (25.0%)	1 (2.0%)	8 (13.1%)
N	27	12	61	36	50	61

Former Bunting Fellows who recorded differences between men and women scientists most frequently noted that women publish less (code 25: 44.4%). Women appear to be much more prone than men to mention differences in publication rates. Among the NRC Associates, 18 women (29.5%), but not a single man alluded to this topic. Among the NSF Fellows, the proportion is 13 women (26.0%) vs. three men (4.9%). Another interesting difference between men's and women's responses exists among the NRC Associates on code 22. Whereas almost half of the NRC women (49.2%) noted that women are less aggressive, confident, or take fewer risks, only 8.3% of the NRC men did so.

The third variable indicates whether respondents elaborated a theory of why in their opinion women scientists are different from men scientists.

	PA-2	PA-3	PA-4	PA-5	PA-6f	PA-6m
Yes	16 (45.7%)	4 (33.3%)	20 (34.5%)	11 (28.2%)	28 (49.1%)	28 (40.6%)
No	19 (54.3%)	8 (66.7%)	38 (65.5%)	28 (71.8%)	29 (50.9%)	41 (59.4%)
N	35	12	58	39	57	69

Whereas in all sub-groups responses that elaborated some causal theory of gender differences among scientists were outweighed by those that did not, men were somewhat less likely to volunteer such a theory than women.

The forth variable distinguishes different types of causal theories. Seven codes were formed:

- 21: Family demands.
- 22: Discrimination.
- 23: Minority position in a male-dominated domain.
- 24: Two career mobility problem.
- 25: Women have more interests besides a science career, are less fixated on career.
- 26: Other.
- 27: Lack of societal support and role models.

Again, we present some responses by former Bunting Fellows to illustrate the codes.

- 21: Family demands.
"Yes. Many male scientists spend less time on their family life at this stage of their careers. They can go to conferences, work late at their offices and work weekends to an extent that women with children cannot. ..."(ID47)

- 22: Discrimination.
"... Sexism is rampant in all phases of academic life including bias in what is deemed "universal," what is legitimate area of research, style/format of presentation - there is much discrimination in rate of publication, who controls publications, etc."(ID141)

- 23: Minority position in a male-dominated domain.
"... I feel that getting contracts is not always easy for women, as the old boy network plays a big role in that. I also feel that women who have reached some status in their field do not always help others, even though they like to get advertised as ones supportive of other women. In fact my experience has been that men will support women more than women tend to support each other, and , therefore, it is best to work in an atmosphere which is cosmopolitan in this sense."(ID507)

- 24: Two career mobility problem.
"... One of the main problems is also finding two jobs in the same geographical area - the woman often loses."(ID79)

- 25: Women have more interests besides a science career, are less fixated on career.
"Yes. Most [symbol for women] scientists I've known tend to be less ambitious about science and pursue other interests beyond science e.g. family, childcare, community work, to a greater extent than [symbol for men]. ... Most effective [symbol for men] scientists spend long hours at their work but do not pursue other interests, including home making, to any great extent."(PA-3; ID17)

- 27: Lack of societal support and role models.
"There is a certain "squeezing" process involved in becoming a scientist. How much one has to be "squeezed" seems to me a function of personality more than sex, i.e. how much compression one must [? hard to make out] accept (or need) to become molded to an acceptable style. The socialization of women often pushes them when young away from that mold. In that sense, some females have a harder time. ..."(ID502)

The following table shows the frequency distribution of types of causal theories about gender differences among scientists.

	PA-2	PA-3	PA-4	PA-5	PA-6f	PA-6m
21	15 (60.0%)	4 (57.1%)	19 (52.8%)	7 (25.0%)	24 (52.2%)	20 (35.7%)
22	5 (20.0%)	0	6 (16.7%)	6 (21.4%)	6 (13.0%)	6 (10.7%)
23	4 (16.0%)	3 (42.9%)	8 (22.2%)	4 (14.3%)	12 (26.1%)	9 (16.1%)
24	1 (4.0%)	0	5 (13.9%)	0	4 (8.7%)	2 (3.6%)
25	0	1 (14.3%)	5 (13.9%)	2 (7.1%)	3 (6.5%)	11 (19.6%)
26	1 (4.0%)	0	6 (16.7%)	11 (39.3%)	13 (28.3%)	6 (10.7%)
27	4 (16.0%)	1 (14.3%)	10 (27.8%)	2 (7.1%)	4 (8.7%)	15 (26.8%)
N	25	7	36	28	46	56

The predominant response refers to family demands (code 21). In every group of women scientists, more than half of the respondents mentioned family demands (PA-2: 60.0%; PA-3: 57.1%; PA-4: 52.8%; PA-6f: 52.2%). Men mentioned family demands less frequently (PA-5: 25.0%; PA-6m: 35.7%).

B. Career obstacles. The question was: "Were there and/or are there now factors seriously interfering with your working as a research scientist at a level commensurate with your training, ability, and desire? If so, describe these factors."

Responses were grouped in seven categories:

- 21: Family demands.
- 22: Two career mobility problem.
- 23: Teaching, administrative duties, or grant writing.
- 24: Lack of adequate job, funding, or other institutional support (students, lab space).
- 25: Bad interpersonal relationships with colleagues or mentors.
- 26: Discrimination.
- 27: Other.

The following quotes exemplify the above codes.

- 21: Family demands.
"Surely, raising four children interferes with my career. But I always found part time jobs which were interesting and was able to do research full time when they were out on their own. There hasn't been that much time on this side. Probably, a woman who wants a career more than anything should not try to raise children."(ID168)

- 22: Two career mobility problem.
"I was born 10 years too early. My training was superb and had I been a man I would have had a choice of first rate post-doc appts. when I received my degree. However my husband had been waiting for me to finish my degree and now had an academic offer from Syracuse University, so we moved to N.Y. State for two years. This cut into the royal road of success for me (which was then questionable for a woman anyhow). When we came back to the Boston area I got a position at Simmons College. I thought I would get independence and I thought I could do all the teaching, research and tending my new son. That was difficult, and I appreciated the Bunting fellowship to get me back to the forefront and on track. By that time however it was too long after my Ph.D. to compete effectively for tenure track positions at res. universities."(ID79)

- 23: Teaching, administrative duties, or grant writing.
"Yes. I have heavy teaching responsibilities which prevent concentration on research and writing during the semester." (ID120)

- 24: Lack of adequate job, funding, or other institutional support (students, lab space).

"Like so many women in the biomedical sciences, and especially Ph.D.'s, I had a soft-money, non-tenure-line appointment usually held by those working under supervision, but was required to generate my own ideas and funds. Had I a regular academic appointment (my dept. at one point voted unanimously that I deserved a full professorship but would not appropriate the money - 1/3 of my salary - required), I would have been able to have graduate students helping me, colleagues willing to collaborate, an easier time raising grant money, and a position from which to compete for professional offices."(ID88)

- 25: Bad interpersonal relationships with colleagues or mentors.

"Yes, I believe the fact that I was a woman stood in the way, at various points in time, in my being accepted by colleagues as a working partner. I wasn't one of the boys and I was not considered when new openings were being considered."(ID158)

- 26: Discrimination.

"I am still facing a great deal of discrimination as a woman. Some full professors have said to me (without a witness present) that no woman will be a full professor. In fact, this year a male in my general field who is junior to me & has fewer publications was promoted (he had an offer elsewhere). When I questioned this, I found out that no one had even looked at my vita to see if I should be considered. "After all, you don't have an NSF," but I do and the person who said the quote is in a position to know that I do but chooses to not know. I find all of this infuriating and it interferes with my research."(ID67)

The frequency distribution of the response types to the question about career obstacles is given in the table below.

	PA-2	PA-3	PA-4	PA-5	PA-6f	PA-6m
21	11 (31.4%)	2 (18.2%)	12 (20.0%)	0	13 (22.8%)	4 (3.7%)
22	2 (5.7%)	1 (9.1%)	8 (13.3%)	2 (3.0%)	5 (8.8%)	0
23	6 (17.1%)	4 (36.7%)	10 (16.7%)	37 (55.2%)	13 (22.8%)	49 (45.8%)
24	9 (25.7%)	3 (27.3%)	20 (33.3%)	24 (35.8%)	26 (45.6%)	49 (45.8%)
25	3 (8.6%)	1 (9.1%)	7 (11.7%)	3 (4.5%)	5 (8.8%)	6 (5.6%)
26	4 (11.4%)	0	6 (10.0%)	1 (1.5%)	8 (14.0%)	0
27	13 (37.1%)	3 (27.3%)	11 (18.3%)	13 (19.4%)	9 (15.8%)	18 (16.8%)
N	35	11	60	67	57	107

Almost a third of the former Bunting Fellows who responded to the question about career obstacles mentioned family demands (code 21: 31.4%). In contrast, men rarely indicated that family demands had been obstacles to their careers (PA-5: 0%; PA6m: 3.7%). They most frequently noted that teaching, administrative duties, or grant writing interfered with their careers (code 23, PA-5: 55.2%; PA-6m: 45.8%). Many former NSF Fellows of both genders identified the lack of an adequate job, funding, or other institutional support (students, lab space) as a career obstacle (code 24, PA-6f: 45.6%; PA-6m: 45.8%), whereas roughly a third of the NRC Associates (PA-4: 33.3%; PA-5: 35.8%) and a quarter of the Bunting Fellows (25.7%) gave responses of this kind.

Appendix A-1

PROJECT ACCESS
A Study of Access to Scientific Research
In Cooperation with the Bunting Institute of Radcliffe College,
Sponsored by the Office of Naval Research

CONFIDENTIAL QUESTIONNAIRE TO NSF POSTDOCTORAL FELLOWS
(PA-6)

PLEASE NOTE:

• We earnestly seek your participation in this Project. Its objective is the improvement of our understanding of how scientists gain access to good research careers (including careers in mathematics, natural sciences, social sciences, and engineering) and what some of the obstacles may be.

• Be assured that full confidentiality of your responses will be preserved. Neither names nor other personal identification will be associated with the questionnaire or with the research results.

• Please complete the questionnaire even if you are not now an active research scientist, but were trained as a scientist or social scientist (generally interpreted) in your graduate studies.

• Thank you in advance for generously giving your time and providing your frank replies to this necessarily searching questionnaire. Kindly return it, using the enclosed stamped envelope, WITHIN THE NEXT TWO WEEKS.

Return the completed questionnaire to:

PROJECT ACCESS
358 Jefferson Lab., Harvard University,
Cambridge, MA 02138

<003> Today's Date: _____

NOTE: **The terms "Fellow" and "Fellowship" will be used throughout this questionnaire to mean NSF Postdoctoral Fellow and your <u>first</u> postdoctoral NSF Fellowship.** (We do not mean graduate or predoctoral fellowships.) The term "scientist" refers to social and natural scientists, and to engineers and mathematicians.

A. Listed below are a number of commonly made statements which may or may not reflect the experience of a Fellow. For each statement, please indicate whether the statement is true or false with respect to your own experience as a Fellow.

Then, if you indicated that the statement was "TRUE" in your case, please indicate the influence that this aspect of the Fellowship had on your own subsequent scientific career development, by circling one number on the scale to the right of each statement. (Add comments if you wish.)

1 - Negative
2 - No Influence (Neutral)
3 - Slightly Positive
4 - Moderately Positive
5 - Very Positive

<u>Aspect of a Fellowship</u>

• A Fellowship provides one with more access to scientific resources (equipment, supplies, etc.) than would be available without the Fellowship.

<216> In my case:

<1>____ TRUE <2> ____ FALSE

<217> If true, 1 2 3 4 5

<218> Comments:

• A Fellowship makes available interaction with other scholars who are not scientists to a greater degree than would be so without the Fellowship.

<222> In my case:

<1>____ TRUE <2> ____ FALSE

<223> If true, 1 2 3 4 5

<224> Comments:

• A Fellowship allows for collaboration with other scientists in one's field to a greater degree than would be so without the Fellowship.

<225> In my case:

<1>____ TRUE <2> ____ FALSE

<226> If true, 1 2 3 4 5

<227> Comments:

• A Fellowship makes available interaction with women scientists, to a greater degree than would be so without the Fellowship.

<219> In my case:

<1>____ TRUE <2> ____ FALSE

<221> Comments:

<220> If true, 1 2 3 4 5

• During the Fellowship period, one makes professional contacts which lead to post-Fellowship support (e.g. faculty position, consulting)—contacts which would be more difficult to make without a Fellowship.

<228> In my case:

<1>____ TRUE <2> ____ FALSE

<229> If true, 1 2 3 4 5

<230> Comments:

• A Fellowship provides time for reflection and re-energizing which would not otherwise be available.

<231> In my case:

<1>____ TRUE <2> ____ FALSE

<233> Comments:

<232> If true, 1 2 3 4 5

• A Fellowship exposes one to scientific stimulation, in the form of symposia, colloquia, opportunities to present papers, etc.—to a greater degree than would be so without the Fellowship.

<234> In my case:

<1>____ TRUE <2> ____ FALSE

<235> If true, 1 2 3 4 5

<236> Comments:

• A Fellowship provides recognition and affirmation of one's professional status which one would not have to the same degree without the Fellowship.

<237> In my case:

<1>____ TRUE <2> ____ FALSE

<238> If true, 1 2 3 4 5

<239> Comments:

B. Listed below are common descriptive aspects of postdoctoral Fellowships. Please indicate the impact of each on your professional development as a scientist and on your personal growth as a whole. For each aspect, circle one number on the scale of 1 to 5 next to "professional development" and one number on the scale next to "personal growth," using the following scale. Again, comment if you wish.

1 - Largely Negative
2 - Somewhat Negative
3 - No Impact (Neutral)
4 - Somewhat Positive
5 - Largely Positive

Aspect of Fellowship						
• While Fellows, scientists spend more time on a particular research project (or projects) than they could have done otherwise.	<210> Impact on my Professional Development	1	2	3	4	5
	<211> Impact on my Personal Growth	1	2	3	4	5
<212> Comments:						
• Through Fellowships, Fellows are formally affiliated with one or more senior scientists, with whom they could not have worked otherwise.	<213> Impact on my Professional Development	1	2	3	4	5
	<214> Impact on my Personal Growth	1	2	3	4	5
<215> Comments:						

C. DISCUSSION

<250> For each of the aspects of the Fellowship in the previous questions (pages 1-3), that you indicated had a negative influence on your career, please elaborate on why this impact was negative.

<252> In what respects, additional to those listed in the previous questions (pages 1-3), did your Fellowship, or your experience while a Fellow, help your subsequent professional development as a scientist?

... ...
... ...
... ...
... ...
... ...

<254> In what respects, other than those listed in the previous questions (pages 1-3), did your Fellowship, or your experience while a Fellow, hinder your
... ... subsequent professional development as a scientist?

D. RESEARCH STYLE

How would you characterize your working style in scientific research before, during, and after the period of your Fellowship? For each of the three periods below ("before," "during," and "after" Fellowship period) write in one number from the list below that best corresponds to the appropriate workir.ɜ style.

1 - I usually work(ed) alone on my scientific problems.
2 - I primarily work(ed) alone, but at certain points in my research there is (was) significant collaboration with other scientists.
3 - Individual research and collaboration were (are) about equally frequent in my research.
4 - I collaborate(d) with one or more scientists more than I work(ed) alone.
5 - My research was (is) performed almost exclusively in collaboration with other scientists.

<256> _____ BEFORE the Fellowship

<257> _____ DURING the Fellowship

<258> _____ AFTER the Fellowship

<260-3> If your research style, with respect to collaboration or other factors, changed significantly between the time when you began doing research and the present, please explain the change, and the factors that caused it (including the role the Fellowship may have had).

<270> Did you change fields or subfields while a Fellow?

<1> _____ I made a significant change
<2> _____ I did not make a significant change
<3> _____ I broadened my field
<4> _____ I changed careers from research to another profession, such as administration.

• If so, what was your initial subfield? Please refer to code numbers in the list at the end of the questionnaire, for example, Plant Genetics [115].

<271> Initial subfield code: _____

<273> Subfield code to which you changed: _____

<275> What role did your Fellowship play in this transition?

<285-9> Did attractive career opportunities (in scientific research and or other fields) offer themselves to you while you were a Fellow or afterwards, which you did not or could not pursue? If so, what were these opportunities? When did these opportunities arise? Why did you not pursue them?

<800> Are you currently engaged to a significant degree in scientific research?

<1>_____ Yes <2>_____ No

<801> If not, how many years after the start of your Fellowship did you cease to be an active researcher?

___ ___ Years

<802> What were the major reasons for this change?

<295> Have there been and/or are there now factors seriously interfering with your working as a research scientist at a level commensurate with your training, ability, and desire?

<1>_____ Yes <2>_____ No

<296> If so, describe these factors.

<297-9> What factors have determined the degree of absorption you have experienced in your scientific research projects (for example, intrinsic interest in the subject matter; the need to get work done and published as a prerequisite for professional success)?

<305> Answer "True" or "False" (and comment if you like): In my field of science, one must have the time and energy to give full attention to a research project, sometimes for prolonged periods (days, nights).

<1>_____ True <2>_____ False

<306> Comments:

<310> If you answered the previous question "True," have you typically been able to give time to a project in such an intensive way?

<1>_____ Yes <2>_____ No <3>_____ Sometimes/partly

<312> Were you able to give time to research projects in such an intensive way during your Fellowship?

<1>_____ Yes <2>_____ No <3> _____ Sometimes/partly

<313> Are you able to do so now?

<1>_____ Yes <2>_____ No <3> _____ Sometimes/partly

<311> Comments:

<315> Was a family member, teacher, and/or other person influential in your decision to become a scientist?

<1>_____ Yes <2>_____ No

<316-9> If "Yes," describe. Do you consider these persons to have been role models? Also note how old you were when these persons influenced you with respect to science.

<280-3> Do you believe, on the basis of your observation, that there are <u>on the average</u> differences between the way men scientists and women scientists at the same career stages do research on scientific problems (e.g. style of work, interests, type of problems selected, rate of publication, quality of publication)? If so, what are these differences, and what may be some of their causes?

E. QUESTIONS ABOUT GRADUATE SCHOOL

<401> Graduate University _____

Department (or committee, center, institute, etc.) _____

<405> What is your highest degree?

<00>_____ Ph.D
<01>_____ B.A./A.B.
<02>_____ B.S.
<03>_____ B.S.E.
<04>_____ M.A.
<05>_____ M.S./S.M.
<06>_____ M.S.E.
<07> _____ M.Ed.
<08> _____ M.D.
<09> _____ J.D.
<10> _____ D.Sc.
<11> _____ Ed.D.
<12> _____ OTHER_____

<406> In which year did you receive your highest degree? 19___ ___

• From the time you received your first baccalaureate degree (or equivalent) through the time you received your Ph.D. (or equivalent), how many years*, including years spent on dissertation, were you:

* Count academic years as full calendar years. Total should sum to number of years elapsed between baccalaureate and doctorate.

<407> _____ A full-time student

<408> _____ A part-time student

<409> _____ Not working on a degree

<411> Did you hold an assistantship during graduate school? (Check all that apply.)

<1> _____ Research
<3> _____ Teaching
<2> _____ None
<4> _____ Other _____

<750> Did you hold an assistantship:

<1> _____ throughout graduate school?
<2> _____ more than half the time?
<3> _____ about half the time?
<4> _____ less than half the time?
<5> _____ not at all

<412> If you held an Assistantship while a graduate student, how did it affect your professional development?

<1> _____ It hindered my professional development greatly
<2> _____ It hindered my professional development somewhat
<3> _____ It neither hindered nor helped
<4> _____ It helped my professional development somewhat
<5> _____ It helped my professional development greatly

<413> When you received your doctorate, or the equivalent, did you have any debt directly related to your undergraduate and/or graduate education (tuition, fees, living, books, etc.)?

<1> _____ Yes <2> _____ No

<414> How large was this debt?

<0> _____ None
<1> _____ $5,000 or less
<2> _____ $5,001-$10,000
<3> _____ $10,001-$20,000
<4> _____ $20,001-$30,000
<5> _____ $30,001 or more

• How did you finance your doctoral (or equivalent) studies? Please indicate to the left of each funding source below the approximate percentage which that source contributed to your total graduate school expenses, as best you can remember. (Write "0" if you received no funds from a particular source.)

	CONTRIBUTION	FUNDING SOURCE
<415>	_____ %	Contributions from family (other than spouse)
<416>	_____ %	Teaching Assistantships
<417>	_____ %	Research Assistantships
<418>	_____ %	Earnings from jobs unrelated to your academic work
<419>	_____ %	Personal savings
<420>	_____ %	Contributions from spouse or other close person
<421>	_____ %	Student Loans
<422>	_____ %	Fellowships
<424>	_____ %	Other
	100 %	

<423> Please check each source from which you received a fellowship for graduate work that you held for at least one academic year:

<01> _____ National Science Foundation (NSF)
<02> _____ National Institutes of Health (NIH)
<03> _____ National Institute of Mental Health (NIMH)
<04> _____ National Defense Education Act (NDEA)
<05> _____ Ford Foundation
<06> _____ Woodrow Wilson
<07> _____ Social Science Research Council (SSRC)
<08> _____ Association of University Women (AAUW/IAUW)
<09> _____ Other women's funding organization
<10> _____ Minority funding organization
<11> _____ Your home graduate institution
<12> _____ Other private foundation or corporate sponsor
<13> _____ Professional Society (e.g. American Psychological Association)
<14> _____ Fulbright
<15> _____ Rhodes
<88> _____ Other Fellowship _____

<426> Which of the following best describes your status during the year immediately preceding the award of your highest degree?

<1> _____ Full-time employed
<2> _____ Held fellowship
<3> _____ Held assistantship
<4> _____ Part-time employed
<5> _____ Not employed
<6> _____ Other _____

F. QUESTIONS ABOUT YOUR PRINCIPAL DISSERTATION ADVISOR

Please give the following information about the principal advisor for your Ph.D. dissertation (or equivalent). List his or her title, rank, etc., AT THE TIME YOU WERE WORKING ON YOUR DISSERTATION RESEARCH, as best you can recall.

<450> Rank (check one):

<1> _____ Professor
<2> _____ Associate Professor
<3> _____ Assistant Professor
<4> _____ Instructor or Lecturer
<5> _____ Other

<452> Special Title :

<0> _____ None
<1> _____ Held named faculty chair
<2> _____ Was department chair
<3> _____ Was director of a research institute
<8> _____ Other _____

<453> Was your principal dissertation advisor:

<1> _____ Male <2> _____ Female

<454> Was your principal dissertation advisor tenured when you were performing your dissertation research?

<1> _____ Yes <2> _____ No

<455> When you were performing your dissertation research, was your principal dissertation advisor the scientist with whom you actually worked most closely?

<1> _____ Yes <2> _____ No

<456> Comments:

G. QUESTIONS ABOUT YOUR POSTDOCTORAL APPOINTMENTS

<760> What was title of your first NSF postdoctoral Fellowship?

<1> _____ NSF Postdoctoral Fellowship
<2> _____ NSF Senior Postdoctoral Fellowship
<3> _____ NSF Faculty Fellowship
<4> _____ NATO Postdoctoral Fellowship
<5> _____ Other _____

<475> In what year did you first apply for an NSF Postdoctoral Fellowship?
19 ___ ___

- What were the dates during which you held your Fellowship?

<476> FROM (mo/yr) ____ / ____ <477> TO (mo/yr) ____ / ____

<511> At which INSTITUTION: _____

DEPARTMENT: _____

<512> Were you formally affiliated with one or more scientists on the staff of the institution where you performed most of your research while you were a Fellow?

<1> _____ Yes <2> _____ No

<513> If you answered "Yes," was the scientist with whom you were most closely affiliated:

<1> _____ Relatively Senior in Rank
<2> _____ Relatively Junior in Rank

<514> If you answered "Yes," was the scientist with whom you were most closely affiliated:

<1> _____ Male <2> _____ Female

<515> Were there any other scientists with whom you worked closely or who otherwise significantly influenced your work while a Fellow?

<1> _____ Yes <2> _____ No

<516> Comments:

NOTE: For the purposes of questions below, POSTDOCTORAL APPOINTMENT means a temporary appointment, the primary purpose of which is to provide for continued education or experience in research, usually, though not necessarily, under the supervision of a senior mentor. Included are appointments in government and industrial laboratories which resemble in their character and objectives postdoctoral appointments in universities. Excluded are residency training programs in the health professions.

• Since obtaining your highest degree, have you applied for any postdoctoral appointments (as defined above) other than your award from the NSF? Please specify the sources of the appointments, whether or not your application was successful, and the years in which they were awarded:

<482> SOURCE	<484> SUCCESSFUL? ("YES" or "NO")	<485> YEAR AWARDED (IF SUCCESSFUL)
. . . _____	_____	_____
. . . _____	_____	_____
. . . _____	_____	_____
. . . _____	_____	_____
. . . _____	_____	_____

<486> What were the reasons for taking your FIRST postdoctoral appointment (your Fellowship, if that was your first)? Number factors in order of importance using "1" to designate the most important.

<1> _____ To obtain additional research experience in your field
<2> _____ To work with a particular scientist or research group
<3> _____ To switch into a different field of research
<4> _____ Couldn't obtain type of position you wanted
<5> _____ To be in same location as spouse or other close person
<6> _____ To finish a book or other major project
<8> _____ Other _____

<489> If your Fellowship was not your first postdoctoral appointment, what were the reasons for taking your Fellowship? Number factors in order of importance using "1" to designate the most important.

<1> _____ To obtain additional research experience in your field
<2> _____ To work with a particular scientist or research group
<3> _____ To switch into a different field of research
<4> _____ Couldn't obtain type of position you wanted
<5> _____ To be in same location as spouse or other close person
<6> _____ To finish a book or other major project
<8> _____ Other _____

<491> Did you prolong the length of time you held any postdoctoral appointment, including your Fellowship, beyond the initial term of the appointment?

<1> _____ Yes <2> _____ No

<492> If "Yes," did you do so because of difficulty in finding other employment you wanted?

<1> _____ Yes <2> _____ No <3> _____ Partly/Somewhat

<493> How important was your Fellowship in enabling you to ATTAIN your present positions?

<1> _____ Turned out to be essential
<2> _____ Helpful but not essential
<3> _____ Made no difference
<4> _____ Cannot determine

<494> In terms of its contribution to your professional advancement, your experience while a Fellow was:

<1> _____ very valuable
<2> _____ useful
<3> _____ not useful
<4> _____ cannot determine

<495> How many TOTAL MONTHS have you held postdoctoral appointments (including your Fellowship and all other postdoctoral appointments you may have held)?

___ ___ *Total Months*

<496> For all postdoctoral appointments you have held (including your Fellowship), how many different mentors have you had? ___ ___

<497> Since receiving your doctoral degree, have you held any UNIVERSITY RESEARCH POSITIONS which were considered neither faculty nor postdoctoral appointments?

<1> _____ Yes <2> _____ No

<498> If "YES," how many TOTAL MONTHS have you held these university research positions (include the months you have spent in your present position, if applicable)? ___ ___ ___

H. QUESTIONS ABOUT YOUR RESEARCH INTERESTS AND ACTIVITIES

What was/is your general scientific field (e.g. astronomy, economics, psychology), and what is your subfield or specialty? Please use code number(s) from the list of specialties on the last page of this questionnaire. If your specialty is not listed, write in your specialty.

		General Field	Subfield Code(s) (write out, if necessary)
<520>	While doing PhD	_____	_____
		_____	_____
<522>	While a Fellow	_____	_____
		_____	_____
<524>	Now, or when last doing research	_____	_____
		_____	_____

<530> Are you now part of a scientific research team?

<1> _____ Yes <2> _____ No

<531> If not, why not? (Check only one.)

<1> _____ I am part of a loosely-connected group of collaborators
<2> _____ There is no one at my location with whom I can collaborate
<3> _____ Working on a research team is not the norm in my field/job
<4> _____ I am retired
<5> _____ I prefer not to work with a research team
<6> _____ I am not an active science researcher
<8> _____ Other _____

• If you are now part of a research team, about how many people are part of this team?

	NUMBER	TYPE OF STAFF
<532>	_____	Professional Scientists (including faculty)
<533>	_____	Postdoctoral Fellows
<534>	_____	Graduate Assistants
<535>	_____	Technicians
<536>	_____	Clerical/administrative/support

I. QUESTIONS ABOUT YOUR CURRENT EMPLOYMENT

Please answer the following questions with respect to your PRINCIPAL employment or postdoctoral employment AS OF JANUARY 1988.

<550> Which BEST describes your employment status? (Check only one.)

<1> _____ Full-time postdoctoral appointment (as defined above)
<2> _____ Part-time postdoctoral appointment (as defined above)
<3> _____ Full-time employed (other than postdoctoral employment)
<4> _____ Part-time employed (other than postdoctoral appointment)
<5> _____ Unemployed and seeking employment
<6> _____ Unemployed and not seeking employment
<7> _____ Student (other than postdoctoral appointment)
<8> _____ Other status

NOTE: If you checked items <5>, <6>, or <7> in the previous question above, please skip to item <580> on page 19.

<553> Which category below BEST describes the type of organization of your employer? (Check only one.)

<01> _____ University or 4-year college (other than <02> and <06>)
<02> _____ Medical school or other health professional school (including university-affiliated teaching hospital)
<03> _____ Two-year college or technical school
<04> _____ Elementary or secondary school
<05> _____ Other educational institution
<06> _____ FFRDC Laboratory (federally funded research and development centers such as Brookhaven, Lincoln, Los Alamos, Oak Ridge...)
<07> _____ Federal government (including military)
<08> _____ State or local government
<09> _____ Business or industry
<10> _____ Hospital or clinic (other than those included above)
<11> _____ Nonprofit organization (other than those included above)
<12> _____ Self-employed
<88> _____ Other type of employer

<556> What is the name (institution/organization) of your employer or postdoctoral affiliation? _____

<557> What is the STATE in which the institution or organization is located? Use the two letter postal code, e.g. "MO" for Missouri, or "ZZ" if you work outside of the U.S. ___ ___

<558> In what month and year did your employment start at this institution/ organization? _____ / _____

<560> Which category BEST describes the type of position you hold, if affiliated with an institution of higher education?

<1> _____ Faculty
<2> _____ Postdoctoral Appointment (as defined above)
<3> _____ Other research staff (not primarily an academic appointment)
<4> _____ Other teaching staff (not primarily an academic appointment)
<5> _____ Other _____

<562> If you are on the faculty of an institution of higher education named in <556>, what is your academic rank? (Check one.)

<1> _____ Professor
<2> _____ Associate Professor
<3> _____ Assistant Professor
<4> _____ Instructor or Lecturer
<5> _____ Other _____

<564> Are you primarily employed in a research unit OUTSIDE the traditional academic/departmental structure?

<1> _____ Yes <2> _____ No

<565> Do you now have tenure?

<1> _____ Yes <2> _____ No

<566> If "No," is your position considered to be on a tenure track?

<1> _____ Yes <2> _____ No

<567> If you do have tenure, in what year did you receive it? 19 ___ ___

<568> If you have been and/or are now a university faculty member, what is the total number of graduate students whose Ph.D. theses you have supervised?
___ ___ ___

<569> Over how many years have you supervised students writing Ph.D. theses?
___ ___

• What percentage of the time you give to your principal employment (as of January 1988) is devoted to each of the following activities?

	TIME		ACTIVITY
<570>	_____	%	BASIC RESEARCH (including supervision of students engaged in research)
<571>	_____	%	APPLIED RESEARCH AND DEVELOPMENT (including supervision of students engaged in research)
<572>	_____	%	CLASSROOM TEACHING (not involving research supervision)
<573>	_____	%	ADMINISTRATION/MANAGEMENT
<574>	_____	%	CONSULTING
<575>	_____	%	PROFESSIONAL SERVICE (other than consulting)
<576>	_____	%	OTHER
	100	%	TOTAL

<578> If your activities include research, which of the following federal agencies, if any, have supported the research in which you have been engaged? (Check all that apply.)

<01> _____ No federal support for research
<02> _____ ADAMHA (National Institute of Mental Health, National Institute on Alcohol and Alcoholism, and National Institute on Drug Abuse)
<03> _____ Department of Defense
<04> _____ Department of Energy
<05> _____ National Aeronautics and Space Administration (NASA)
<06> _____ National Institutes of Health (NIH)
<07> _____ National Science Foundation (NSF)
<08> _____ National Endowment for the Humanities (NEH)
<09> _____ Dept. of Health and Human Services
<10> _____ Dept. of Agriculture
<11> _____ United States Geological Survey (USGS)
<12> _____ Dept. of Interior
<13> _____ Environmental Protection Agency (EPA)
<88> _____ Other Federal Agencies _____

<580> If you are NOT currently a working scientist or otherwise engaged in science-related professional activities, what is currently your primary occupation?

<1> _____ Business/industry (not involving research)
<2> _____ Government (not involving research)
<3> _____ University/college (not involving research)
<4> _____ Homemaking/child care
<5> _____ Retired
<6> _____ Elementary or secondary teaching
<7> _____ Public service (e.g. nonprofit , hospital, utility)
<8> _____ Self-employed (and not in any of the above categories)
<9> _____ Other _____

<581> What is the approximate basic annual salary* associated with your principal employment? If you are now holding a postdoctoral appointment as defined above and receive a stipend, include the stipend plus allowances.

* Include your gross salary before deductions for income tax, social security, retirement, etc., but do NOT include bonuses, overtime, summer teaching, consulting, or other payment for professional work.

<1> _____ $15,000 OR LESS
<2> _____ $15,001 to $20,000
<3> _____ $20,001 to $25,000
<4> _____ $25,001 to $30,000
<5> _____ $30,001 to $35,000
<6> _____ $35,001 to $40,000
<7> _____ $40,001 to $45,000
<8> _____ $45,001 to $50,000
<9> _____ OVER $50,000

<582> Which of the following BEST describes your plans for the near future? (Check one.)

<1> _____ Not actively seeking new position
<2> _____ Actively seeking new position (present position terminates shortly)
<3> _____ Actively seeking new position (dissatisfaction with present position)
<4> _____ Relocating because spouse (or other close person) has taken a new position
<5> _____ Retired
<6> _____ Recently taken a new job or about to do so
<8> _____ Other _____

J. PERSONAL DATA

<600> Year of Birth 19___ ___

<682> Current citizenship (check one)

<1> _____ U.S. native
<2> _____ U.S. naturalized
<3> _____ Non-U.S., immigrant (Permanent Resident)
<4> _____ Non-U.S., non-immigrant (Temporary Resident)

<683> If U.S. naturalized, country of prior citizenship _____

<684> If U.S. naturalized, year of naturalization 19___ ___

<685> If non-U.S. citizen, country of present citizenship _____

• Please give the year of birth and circle the sex of your siblings :

<686> Sibling year of birth	<687>	<686> Sibling year of birth	<687>
_____	M F	_____	M F
_____	M F	_____	M F
_____	M F	_____	M F
_____	M F	_____	M F
_____	M F	_____	M F

<689> When you received your Ph.D., were you:

<3> _____ Married (or in a long-term co-residential relationship)
<4> _____ Single, never married
<5> _____ Separated/divorced
<6> _____ Widowed

<690> During your first postdoctoral appointment (your NSF Fellowship, if that was your first) were you:

<3> _____ Married (or in a long-term co-residential relationship)
<4> _____ Single, never married
<5> _____ Separated/divorced
<6> _____ Widowed

<691> As of January 1, 1988 were you:

<3> _____ Married (or in a long-term co-residential relationship)
<4> _____ Single, never married
<5> _____ Separated/divorced
<6> _____ Widowed

<692> Years of birth of your children (list at side if more than ten):

__ __ __ __ __ __ __ __ __ __

<693> Number of children living with you as of January 1, 1988: _____

<694> Occupation or former occupation of SPOUSE (or equivalent): _____

<695> Occupation or former occupation of MOTHER: _____

<696> Occupation or former occupation of FATHER: _____

• For 697-699, please write the code from the list below corresponding to the highest level of education completed by your spouse (or equivalent), mother, and father. (Fill in the blank with the number corresponding to the appropriate level of education from the list below.)

01 - Less than a high school diploma
02 - High School Diploma
03 - Some undergraduate college
04 - Associate's Degree (AA)
05 - Bachelor's Degree (BS, BA, AB, BBA, BSE)
06 - Some graduate work, but no advanced degree
07 - Master's Degree (MS, MSc, MA, SM, MEd, MFA)
08 - Post-Master's work, but no Ph.D.
09 - Doctoral Degree (PhD, DSc, EdD)
10 - Professional postgraduate degree (e.g. JD, LLB, MBA, DPharm)
11 - Doctor of Medicine (MD, DDS)

<697> _____ SPOUSE (or long-term co-residential partner)
<698> _____ MOTHER
<699> _____ FATHER

• If one or both parents were not living when you reached age 21, please indicate the year of death:

<765> _____ Mother <766> _____ Father

<767> If your parents were divorced or separated when you reached age 21, please indicate the year:

19 __ __

<770> Are you: <1> _____ Male <2> _____ Female

<780> Please indicate the racial heritage which most closely identifies you in the community:

<1> _____ American Indian/Alaskan
<2> _____ Asian or Pacific Islander
<3> _____ Black
<4> _____ White/Caucasian

<785> Is your ethnic heritage Hispanic?

<1> _____ European/Spanish
<2> _____ Puerto Rican
<3> _____ Cuban
<4> _____ Mexican American/Chicano/Chicana
<8> _____ Other Latino/Latina

<790> Are you physically handicapped?

<1> _____ Yes <2> _____ No

<791> What was the year of your impairment? 19___ ___

<792> Up to age 21, did you have a history of one or more prolonged illnesses:

<1> _____ Yes <2> _____ No

K. OTHER COMMENTS

<725-7> Were there major factors which significantly influenced the path of your scientific career, positively and/or negatively, but which could not be deduced from this questionnaire? If so, please explain what they were. (Feel free to attach additional sheets).

. . .
. . .
. . .

We would appreciate your attaching a curriculum vita and a bibliography of your publications when you return the questionnaire. These will be detached from the questionnaire and, together with the following information sheet, kept separately. In addition, please indicate on your bibliography:

— any research published prior to receiving your doctorate or equivalent degree. (Write "PRE-PH.D." next to these items.)
— publications which arose directly out of the research you started while a Fellow. (Write "NSF" next to these items.)

CONFIDENTIAL INFORMATION SHEET

The following information will be used for National Science Foundation records. This sheet will be detached immediately upon receipt of your questionnaire and kept separate.

NAME: _____

SOCIAL SECURITY # (Optional): _____

PREFERRED TITLE (circle one):

Mr. Ms. Miss Mrs. Dr. Prof. Other

WORK ADDRESS: _____

_____

_____

_____

WORK PHONE: (____) _____

HOME ADDRESS: _____

_____

_____

_____

HOME PHONE: (____) _____

SPOUSE'S NAME: _____

SPOUSE'S TITLE: _____

_____ Check here if you would like to receive a summary of the research results.

THANK YOU

Please accept our thanks
for the generous donation of your time
in completing this questionnaire.

LIST OF FIELDS AND SUBFIELDS

The following field listing is to be used in responding to items 271, 273, 520, 522 and 524 (pp.5, 15). If a field marked with an asterisk is chosen, please write in your field of specialization in the space provided.

AGRICULTURE

000 Agricultural Economics

005 Animal Breeding & Genetics
010 Animal Nutrition
019 Animal Sciences, Other*

020 Agronomy
025 Plant Breeding & Genetics
030 Plant Path. (See also 120)
039 Plant Sciences, Other*

040 Food Sciences
045 Soil Sciences
050 Horticulture Science
055 Fisheries Sciences
060 Wildlife Management
065 Forestry Science

098 Agriculture, General
099 Agriculture, Other*

BIOLOGICAL SCIENCES

100 Biochemistry
105 Biophysics

110 Bacteriology
115 Plant Genetics
120 Plant Path. (See also 030)
125 Plant Physiology
129 Botany, Other*

130 Anatomy
133 Biometrics & Biostatistics
136 Cell Biology
139 Ecology
142 Embryology
145 Endocrinology
148 Entomology
151 Immunology
154 Molecular Biology
157 Microbiology
160 Neurosciences
163 Nutritional Sciences
166 Parasitology
169 Toxicology
170 Genetics, Human & Animal
175 Pathology, Human & Animal
180 Pharmacology, Human & Animal
185 Physiology, Human & Animal
189 Zoology, Other*

198 Biological Sciences, General
199 Biological Sciences, Other*

HEALTH SCIENCES

200 Audiology & Speech Pathology
210 Environmental Health
215 Public Health
220 Epidemiology
230 Nursing
240 Pharmacy
250 Veterinary Medicine
298 Health Sciences, General
299 Health Sciences, Other*

ENGINEERING

300 Aerospace, Aeronautical & Astronautical
303 Agricultural
306 Bioengineering & Biomedical
309 Ceramic
312 Chemical
315 Civil
318 Communications
321 Computer
324 Electrical, Electronics
327 Engineering Mechanics
330 Engineering Physics
333 Engineering Science
336 Environmental Health Engin.
339 Industrial
342 Materials Science
345 Mechanical
348 Metallurgical
351 Mining & Mineral
354 Naval Arch. & Marine Engin.
357 Nuclear
360 Ocean
363 Operations Research (See also 465, 930)
366 Petroleum
369 Polymer
372 Systems
398 Engineering, General
399 Engineering, Other*

COMPUTER AND INFORMATION SCIENCES

400 Computer Sciences*
410 Information Sci. & Systems*

MATHEMATICS

420 Applied Mathematics
425 Algebra
430 Analysis & Functional Anal.
435 Geometry
440 Logic (See also 785)
445 Number Theory
450 Probability & Math. Statistics (See also 690)
455 Topology
460 Computing Theory & Practice
465 Operations Research (See also 363, 930)
498 Mathematics, General
499 Mathematics, Other*

PHYSICAL SCIENCES

Astronomy

500 Astronomy
505 Astrophysics

Atmospheric & Meteorological Sciences

510 Atmospheric Physics & Chem.
512 Atmospheric Dynamics
514 Meteorology
518 Atmos. & Meteorol. Sci., Gen.
519 Atmos. & Meteorol. Sci., Other*

Chemistry

520 Analytical
522 Inorganic
524 Nuclear
526 Organic
528 Pharmaceutical
530 Physical
532 Polymer
534 Theoretical
538 Chemistry, General
539 Chemistry, Other*

Geological Sciences

540 Geology
542 Geochemistry
544 Geophysics & Seismology
546 Paleontology
548 Mineralogy, Petrology
550 Stratigraphy, Sedimentation
552 Geomorphology & Glacial Geology
554 Applied Geology
558 Geological Sciences, General
559 Geological Sciences, Other*

Physics

560 Acoustics
561 Atomic & Molecular
562 Electron
564 Elementary Particle
566 Fluids
568 Nuclear
569 Optics
570 Plasma
572 Polymer
574 Solid State
578 Physics, General
579 Physics, Other*

Other Physical Sciences

580 Environmental Sciences
585 Hydrology & Water Resources
590 Oceanography
595 Marine Sciences
599 Physical Sciences, Other*

PSYCHOLOGY

600 Clinical
603 Cognitive
606 Comparative
609 Counseling
612 Developmental
615 Experimental
618 Educational (See also 822)
621 Industrial & Organizational (See also 935)
624 Personality
627 Physiological
630 Psychometrics
633 Quantitative
636 School (See also 825)
639 Social
648 Psychology, General
649 Psychology, Other*

SOCIAL SCIENCES

650 Anthropology
652 Area Studies
658 Criminology
662 Demography
666 Economics
668 Econometrics
670 Geography
674 International Relations
678 Political Sci. & Government
682 Public Policy Studies
686 Sociology
690 Statistics (See also 450)
694 Urban Studies
698 Social Sciences, General
699 Social Sciences, Other*

HUMANITIES

History

700 History, American
705 History, European
710 History of Science
718 History, General
719 History, Other*

Letters

720 Classics
723 Comparative Literature
729 Linguistics
732 Literature, American
733 Literature, English
734 English Language
736 Speech & Debate
738 Letters, General
739 Letters, Other*

Foreign Languages and Literature

740 French
743 German
746 Italian
749 Spanish
752 Russian
755 Slavic (other than Russian)
758 Chinese
762 Japanese
765 Hebrew
768 Arabic
769 Other Languages*

Other Humanities

770 American Studies
773 Archeology
776 Art History & Criticism
780 Music
785 Philosophy (See also 440)
790 Religion (See also 984)
795 Theatre
798 Humanities, General
799 Humanities, Other*

EDUCATION

800 Curriculum & Instruction
805 Educ. Admin. & Superv.
810 Educational Media
815 Educ. Stat. & Research
820 Educ. Testing, Eval. & Meas.
822 Educational Psychology (See also 618)
825 School Psych. (See also 636)
830 Social Foundations
835 Special Education
840 Student Counseling & Personnel Services
845 Higher Education

Teacher Education

850 Pre-elementary
852 Elementary
854 Junior High
856 Secondary
858 Adult & Continuing

Teaching Fields

860 Agricultural Educ.
861 Art Educ.
862 Business Educ.
864 English Educ.
866 Foreign Languages Educ.
868 Health Educ.
870 Home Economics Educ.
872 Industrial Arts Educ.
874 Mathematics Educ.
876 Music Educ.
878 Nursing Educ.
880 Physical Educ.
882 Reading Educ.
884 Science Educ.
885 Social Science Educ.
886 Speech Educ.
888 Trade & Industrial Educ.
889 Teacher & Educ. Specific Subject Areas, Other*

898 Education, General
899 Education, Other*

PROFESSIONAL FIELDS

Business & Management

900 Accounting
905 Banking & Finance
910 Business Admin. & Management
915 Business Economics
920 Marketing Mngmnt. & Research
925 Business Statistics
930 Operations Research (See also 363, 465)
935 Organiz. Beh. (See also 621)
938 Business & Mngmnt., General
939 Business & Mngmnt., Other*

Communications

940 Communications Research
945 Journalism
950 Radio & Television
958 Communications, General
959 Communications, Other*

Other Professional Fields

960 Architec. & Environ. Design
964 Home Economics
968 Law
972 Library & Archival Science
976 Public Administration
980 Social Work
984 Theology (See also 790)
988 Professional Fields, General
989 Professional Fields, Other*

999 OTHER FIELDS*

(Excerpt of 6 pages from 26-page total PA-2)

PROJECT ACCESS

A Study of the Access of Women to Scientific Research
In Cooperation with the Bunting Institute of Radcliffe College,
Sponsored by the Office of Naval Research

CONFIDENTIAL QUESTIONNAIRE OF BUNTING INSTITUTE FELLOWS*

(*prior to 1979 called Radcliffe Institute Fellows)

NOTE:

- As indicated in President Horner's covering letter, we earnestly seek your participation in this Project. Its objective is the improvement of our understanding of how women scientists can more readily gain access to good scientific research careers.
- Be assured that full confidentiality of your responses will be preserved. Neither your name nor other personal identification will be associated with the questionnaire or with the research results.
- Thank you in advance for generously giving your time and providing your frank replies to this questionnaire. Kindly return it, using the enclosed stamped envelope, if possible WITHIN THE NEXT TWO WEEKS.

Please return the completed questionnaire to:

PROJECT ACCESS, 358 Jefferson Lab., Harvard University,
Cambridge, MA 02138

CONFIDENTIAL

TODAY'S DATE: _____

PART I

A. Listed below are five aspects of the Bunting Institute at Radcliffe College (known as the Radcliffe Institute prior to 1979), and the Institute fellowships. Please indicate the impact of each aspect on your professional development as a scientist and your personal growth as a whole. For each aspect, circle one number on the scale of 1 to 5 under "professional development" and one number on the scale under "personal growth."

Space is provided for making comments after each item if you wish.

ASPECT OF THE INSTITUTE	IMPACT ON MY PROFESSIONAL DEVELOPMENT	IMPACT ON MY PERSONAL GROWTH
1. The Institute's fellows represent a wide variety of disciplines in the arts, humanities, and sciences.	1 VERY NEGATIVE 2 SOMEWHAT NEGATIVE 3 NO IMPACT 4 SOMEWHAT POSITIVE 5 VERY POSITIVE	1 VERY NEGATIVE 2 SOMEWHAT NEGATIVE 3 NO IMPACT 4 SOMEWHAT POSITIVE 5 VERY POSITIVE
Comments:		
2. All of the Institute's fellows are women.	1 VERY NEGATIVE 2 SOMEWHAT NEGATIVE 3 NO IMPACT 4 SOMEWHAT POSITIVE 5 VERY POSITIVE	1 VERY NEGATIVE 2 SOMEWHAT NEGATIVE 3 NO IMPACT 4 SOMEWHAT POSITIVE 5 VERY POSITIVE
Comments:		

ASPECT OF THE INSTITUTE	IMPACT ON MY PROFESSIONAL DEVELOPMENT	IMPACT ON MY PERSONAL GROWTH
3. The Institute requires that fellows reside in the Boston area.	1 VERY NEGATIVE 2 SOMEWHAT NEGATIVE 3 NO IMPACT 4 SOMEWHAT POSITIVE 5 VERY POSITIVE	1 VERY NEGATIVE 2 SOMEWHAT NEGATIVE 3 NO IMPACT 4 SOMEWHAT POSITIVE 5 VERY POSITIVE
Comments:		
4. While an Institute fellow, a scientist spends more time on a particular research project (or projects) than she would have done otherwise.	1 VERY NEGATIVE 2 SOMEWHAT NEGATIVE 3 NO IMPACT 4 SOMEWHAT POSITIVE 5 VERY POSITIVE	1 VERY NEGATIVE 2 SOMEWHAT NEGATIVE 3 NO IMPACT 4 SOMEWHAT POSITIVE 5 VERY POSITIVE
Comments:		
5. Through an Institute fellowship, the fellow is formally affiliated with one or more senior scientists, with whom she would not have worked otherwise.	1 VERY NEGATIVE 2 SOMEWHAT NEGATIVE 3 NO IMPACT 4 SOMEWHAT POSITIVE 5 VERY POSITIVE	1 VERY NEGATIVE 2 SOMEWHAT NEGATIVE 3 NO IMPACT 4 SOMEWHAT POSITIVE 5 VERY POSITIVE
Comments:		

B. Listed below are a number of statements which may or may not reflect the experience of a scientist who is an Institute fellow. For each statement, please indicate whether the statement is true or false with respect to your own experience as an Institute fellow. (Circle either "TRUE" or "FALSE.")

Then, if you indicate that the statement was "TRUE" in your case, please indicate the influence that this aspect of the Institute fellowship had on your own subsequent scientific career development, by circling one number on the scale to the right of each statement. (Again, you may add comments if you wish.)

ASPECT OF THE INSTITUTE FELLOWSHIP	(IF YOU CIRCLE "TRUE") INFLUENCE ON MY SCIENTIFIC CAREER DEVELOPMENT
6. An Institute fellowship provides one with more access to scientific resources (equipment, supplies, etc.) than would be so without the fellowship.	1 NEGATIVE 2 NO INFLUENCE (NEUTRAL) 3 SLIGHTLY POSITIVE 4 MODERATELY POSITIVE 5 VERY POSITIVE
In my case: TRUE FALSE	
Comments:	
7. An Institute fellowship makes available interaction with other women scientists, to a greater degree than would be so without the fellowship.	1 NEGATIVE 2 NO INFLUENCE (NEUTRAL) 3 SLIGHTLY POSITIVE 4 MODERATELY POSITIVE 5 VERY POSITIVE
In my case: TRUE FALSE	
Comments:	

ASPECT OF THE INSTITUTE FELLOWSHIP	(IF YOU CIRCLE "TRUE") INFLUENCE ON MY SCIENTIFIC CAREER DEVELOPMENT
8. An Institute fellowship makes available interaction with other scholars who are not scientists, to a greater degree than would be so without the fellowship. In my case: TRUE FALSE Comments:	1 NEGATIVE 2 NO INFLUENCE (NEUTRAL) 3 SLIGHTLY POSITIVE 4 MODERATELY POSITIVE 5 VERY POSITIVE
9. An Institute fellowship allows for collaboration with other scientists in one's field to a greater degree than would be so without the fellowship. In my case: TRUE FALSE Comments:	1 NEGATIVE 2 NO INFLUENCE (NEUTRAL) 3 SLIGHTLY POSITIVE 4 MODERATELY POSITIVE 5 VERY POSITIVE
10. During the Institute fellowship period, one makes professional contacts which lead to post-fellowship support (e.g. faculty position, consulting)--contacts which would be more difficult to make without a fellowship. In my case: TRUE FALSE Comments:	1 NEGATIVE 2 NO INFLUENCE (NEUTRAL) 3 SLIGHTLY POSITIVE 4 MODERATELY POSITIVE 5 VERY POSITIVE

ASPECT OF THE INSTITUTE FELLOWSHIP	(IF YOU CIRCLE "TRUE") INFLUENCE ON MY SCIENTIFIC CAREER DEVELOPMENT
11. An Institute fellowship provides time for reflection and re-energizing which would not otherwise be available. In my case: TRUE FALSE Comments:	1 NEGATIVE 2 NO INFLUENCE (NEUTRAL) 3 SLIGHTLY POSITIVE 4 MODERATELY POSITIVE 5 VERY POSITIVE
12. An Institute fellowship exposes one to scientific stimulation, in the form of symposia, colloquia, opportunities to present papers, etc.--more than would be so without the fellowship. In my case: TRUE FALSE Comments:	1 NEGATIVE 2 NO INFLUENCE (NEUTRAL) 3 SLIGHTLY POSITIVE 4 MODERATELY POSITIVE 5 VERY POSITIVE
13. An Institute fellowship provides recognition and affirmation of one's professional status which one would not have to the same degree without the fellowship. In my case: TRUE FALSE Comments:	1 NEGATIVE 2 NO INFLUENCE (NEUTRAL) 3 SLIGHTLY POSITIVE 4 MODERATELY POSITIVE 5 VERY POSITIVE

C. DISCUSSION

14. For each of the aspects of the Institute in questions 1-13 (immediately above) which you indicated had a negative influence on your career, please elaborate on why this impact was negative.

15. In what respects, additional to those listed in questions 1-13 above, did your Institute fellowship, or your experience while a fellow, help your subsequent professional development as a scientist?

16. In what respects, other than those listed in questions 1-13 above, did your Institute fellowship, or your experience while a fellow, hinder your subsequent professional development as a scientist?

TABLE OF PDOCFLD BY I001

PDOCFLD(GENERAL FIELD AT PDOC (FIRST LISTED))

	I001			
Frequency Percent Row Pct Col Pct	PA-2	PA-4	PA-6f	Total
Agriculture	0 0.00 0.00 0.00	2 0.77 66.67 2.20	1 0.39 33.33 1.01	3 1.16
Biol. Sciences	11 4.25 11.00 15.94	35 13.51 35.00 38.46	54 20.85 54.00 54.55	100 38.61
Health Sciences	1 0.39 33.33 1.45	0 0.00 0.00 0.00	2 0.77 66.67 2.02	3 1.16
Engineering	0 0.00 0.00 0.00	4 1.54 80.00 4.40	1 0.39 20.00 1.01	5 1.93
Comput.Sc.& Math	8 3.09 57.14 11.59	1 0.39 7.14 1.10	5 1.93 35.71 5.05	14 5.41
Physical Sc.	7 2.70 11.29 10.14	42 16.22 67.74 46.15	13 5.02 20.97 13.13	62 23.94
Social Sciences	36 13.90 57.14 52.17	6 2.32 9.52 6.59	21 8.11 33.33 21.21	63 24.32
Humanities	6 2.32 66.67 8.70	1 0.39 11.11 1.10	2 0.77 22.22 2.02	9 3.47
Total	69 26.64	91 35.14	99 38.22	259 100.00

Frequency Missing = 22

TABLE OF PHDFIELD BY I001

PHDFIELD(GENERAL FIELD AT PHD (FIRST LISTED))

	I001			
Frequency Percent Row Pct Col Pct	PA-2	PA-4	PA-6f	Total
Agriculture	0 0.00 0.00 0.00	3 1.16 75.00 3.30	1 0.39 25.00 1.00	4 1.54
Biol. Sciences	12 4.63 12.77 17.65	32 12.36 34.04 35.16	50 19.31 53.19 50.00	94 36.29
Health Sciences	0 0.00 0.00 0.00	1 0.39 50.00 1.10	1 0.39 50.00 1.00	2 0.77
Engineering	0 0.00 0.00 0.00	5 1.93 83.33 5.49	1 0.39 16.67 1.00	6 2.32
Comput.Sc.& Math	7 2.70 53.85 10.29	1 0.39 7.69 1.10	5 1.93 38.46 5.00	13 5.02
Physical Sc.	9 3.47 13.64 13.24	41 15.83 62.12 45.05	16 6.18 24.24 16.00	66 25.48
Social Sciences	35 13.51 53.03 51.47	7 2.70 10.61 7.69	24 9.27 36.36 24.00	66 25.48
Humanities	5 1.93 62.50 7.35	1 0.39 12.50 1.10	2 0.77 25.00 2.00	8 3.09
Total	68 26.25	91 35.14	100 38.61	259 100.00

Frequency Missing = 22

TABLE OF FIELDNOW BY I001

FIELDNOW(GENERAL FIELD NOW (FIRST LISTED))

	I001			
Frequency Percent Row Pct Col Pct	PA-2	PA-4	PA-6f	Total
Agriculture	1 0.39 25.00 1.49	3 1.18 75.00 3.30	0 0.00 0.00 0.00	4 1.57
Biol. Sciences	12 4.71 13.33 17.91	31 12.16 34.44 34.07	47 18.43 52.22 48.45	90 35.29
Health Sciences	2 0.78 28.57 2.99	1 0.39 14.29 1.10	4 1.57 57.14 4.12	7 2.75
Engineering	0 0.00 0.00 0.00	5 1.96 62.50 5.49	3 1.18 37.50 3.09	8 3.14
Comput.Sc.& Math	7 2.75 50.00 10.45	2 0.78 14.29 2.20	5 1.96 35.71 5.15	14 5.49
Physical Sc.	5 1.96 8.47 7.46	39 15.29 66.10 42.86	15 5.88 25.42 15.46	59 23.14
Social Sciences	35 13.73 55.56 52.24	7 2.75 11.11 7.69	21 8.24 33.33 21.65	63 24.71
Humanities	5 1.96 50.00 7.46	3 1.18 30.00 3.30	2 0.78 20.00 2.06	10 3.92
Total	67 26.27	91 35.69	97 38.04	255 100.00

Frequency Missing = 26

APPENDIX E

TABLE OF FIVEYR BY I001

FIVEYR(year of PhD) I001

Frequency Col Pct	PA-2	PA-4	PA-6f	Total
up to 49	3 4.23	1 1.09	0 0.00	4
50-54	5 7.04	0 0.00	1 1.00	6
55-59	6 8.45	1 1.09	6 6.00	13
60-64	9 12.68	1 1.09	15 15.00	25
65-69	15 21.13	7 7.61	9 9.00	31
70-74	14 19.72	8 8.70	8 8.00	30
75-79	15 21.13	29 31.52	39 39.00	83
80-84	4 5.63	40 43.48	20 20.00	64
85+	0 0.00	5 5.43	2 2.00	7
Total	71	92	100	263

Frequency Missing = 18

TABLE OF FIVEFL BY I001

FIVEFL(year of fellowship) I001

Frequency Col Pct	PA-2	PA-4	PA-6f	Total
55-59	0 0.00	0 0.00	4 4.08	4
60-64	9 12.68	0 0.00	14 14.29	23
65-69	12 16.90	2 2.20	12 12.24	26
70-74	15 21.13	6 6.59	6 6.12	27
75-79	6 8.45	23 25.27	34 34.69	63
80-84	22 30.99	50 54.95	22 22.45	94
85+	7 9.86	10 10.99	6 6.12	23
Total	71	91	98	260

Frequency Missing = 21

TABLE OF I213 BY I001

I213(AFFIL. W/SENIOR SCIENTIST-PROF. IMPACT:)
I001

Frequency Percent Row Pct Col Pct	PA-2	PA-4	PA-6f	Total
LARGELY NEG	0 0.00 0.00 0.00	3 1.34 50.00 3.33	3 1.34 50.00 3.06	6 2.68
SOMEWHAT NEG	0 0.00 0.00 0.00	5 2.23 50.00 5.56	5 2.23 50.00 5.10	10 4.46
NEUTRAL	14 6.25 26.92 38.89	10 4.46 19.23 11.11	28 12.50 53.85 28.57	52 23.21
SOMEWHAT POS	6 2.68 11.11 16.67	26 11.61 48.15 28.89	22 9.82 40.74 22.45	54 24.11
LARGELY POS	16 7.14 15.69 44.44	46 20.54 45.10 51.11	40 17.86 39.22 40.82	102 45.54
Total	36 16.07	90 40.18	98 43.75	224 100.00

Frequency Missing = 57

TABLE OF I214 BY I001

I214(AFFIL. W/SENIOR SCIENTIST-PERS. IMPACT:)

I001				
Frequency Percent Row Pct Col Pct	PA-2	PA-4	PA-6f	Total
LARGELY NEG	0 0.00 0.00 0.00	3 1.35 42.86 3.37	4 1.79 57.14 4.08	7 3.14
SOMEWHAT NEG	0 0.00 0.00 0.00	4 1.79 50.00 4.49	4 1.79 50.00 4.08	8 3.59
NEUTRAL	16 7.17 21.92 44.44	22 9.87 30.14 24.72	35 15.70 47.95 35.71	73 32.74
SOMEWHAT POS	10 4.48 15.87 27.78	27 12.11 42.86 30.34	26 11.66 41.27 26.53	63 28.25
LARGELY POS	10 4.48 13.89 27.78	33 14.80 45.83 37.08	29 13.00 40.28 29.59	72 32.29
Total	36 16.14	89 39.91	98 43.95	223 100.00

Frequency Missing = 58

TABLE OF I550 BY I001

I550(YOUR EMPLOYMENT STATUS:) I001

Frequency Percent Row Pct Col Pct	PA-2	PA-4	PA-6f	Total
FULL TIME PD	7 2.64 26.92 9.46	7 2.64 26.92 7.61	12 4.53 46.15 12.12	26 9.81
PART TIME PD	1 0.38 33.33 1.35	2 0.75 66.67 2.17	0 0.00 0.00 0.00	3 1.13
FULL TIME EMP	47 17.74 23.86 63.51	76 28.68 38.58 82.61	74 27.92 37.56 74.75	197 74.34
PART-TIME EMP	8 3.02 40.00 10.81	4 1.51 20.00 4.35	8 3.02 40.00 8.08	20 7.55
UNEMPLOYED SEEKING EMP	2 0.75 50.00 2.70	1 0.38 25.00 1.09	1 0.38 25.00 1.01	4 1.51
UNEMPLOYED NOT SEEKING EMP	1 0.38 50.00 1.35	1 0.38 50.00 1.09	0 0.00 0.00 0.00	2 0.75
STUDENT	0 0.00 0.00 0.00	0 0.00 0.00 0.00	2 0.75 100.00 2.02	2 0.75
OTHER	8 3.02 72.73 10.81	1 0.38 9.09 1.09	2 0.75 18.18 2.02	11 4.15
Total	74 27.92	92 34.72	99 37.36	265 100.00

Frequency Missing = 16

TABLE OF I553 BY I001

I553(TYPE OF EMPLOYER:) I001

Frequency Percent Row Pct Col Pct	PA-2	PA-4	PA-6f	Total
UNIVERSITY	48	28	60	136
	18.75	10.94	23.44	53.13
	35.29	20.59	44.12	
	69.57	30.77	62.50	
MED. SCHOOL	5	4	12	21
	1.95	1.56	4.69	8.20
	23.81	19.05	57.14	
	7.25	4.40	12.50	
TWO YEAR COLL.	1	1	0	2
	0.39	0.39	0.00	0.78
	50.00	50.00	0.00	
	1.45	1.10	0.00	
OTHER EDUC. INST.	0	1	0	1
	0.00	0.39	0.00	0.39
	0.00	100.00	0.00	
	0.00	1.10	0.00	
FFRDC LAB.	1	5	1	7
	0.39	1.95	0.39	2.73
	14.29	71.43	14.29	
	1.45	5.49	1.04	
FEDERAL GOVT.	2	38	6	46
	0.78	14.84	2.34	17.97
	4.35	82.61	13.04	
	2.90	41.76	6.25	
Total	69	91	96	256
	26.95	35.55	37.50	100.00

(Continued)

TABLE OF I553 BY I001

I553(TYPE OF EMPLOYER:) I001

Frequency Percent Row Pct Col Pct	PA-2	PA-4	PA-6f	Total
ST/LOC GOVT.	0 0.00 0.00 0.00	1 0.39 100.00 1.10	0 0.00 0.00 0.00	1 0.39
INDUSTRY	2 0.78 7.69 2.90	12 4.69 46.15 13.19	12 4.69 46.15 12.50	26 10.16
HOSPITAL	1 0.39 50.00 1.45	0 0.00 0.00 0.00	1 0.39 50.00 1.04	2 0.78
NON-PROFIT	3 1.17 50.00 4.35	1 0.39 16.67 1.10	2 0.78 33.33 2.08	6 2.34
SELF-EMPL	5 1.95 71.43 7.25	0 0.00 0.00 0.00	2 0.78 28.57 2.08	7 2.73
OTHER	1 0.39 100.00 1.45	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 0.39
Total	69 26.95	91 35.55	96 37.50	256 100.00

Frequency Missing = 25

APPENDIX L

TABLE OF I560 BY I001

I560(IF AT UNIV., TYPE OF POSITION:) I001

Frequency Percent Row Pct Col Pct	PA-2	PA-4	PA-6f	Total
FACULTY	48	29	59	136
	26.82	16.20	32.96	75.98
	35.29	21.32	43.38	
	85.71	70.73	71.95	
POSTDOC	0	2	5	7
	0.00	1.12	2.79	3.91
	0.00	28.57	71.43	
	0.00	4.88	6.10	
OTHER RES. STAFF	5	8	9	22
	2.79	4.47	5.03	12.29
	22.73	36.36	40.91	
	8.93	19.51	10.98	
OTHER TEA. STAFF	0	1	0	1
	0.00	0.56	0.00	0.56
	0.00	100.00	0.00	
	0.00	2.44	0.00	
OTHER	3	1	9	13
	1.68	0.56	5.03	7.26
	23.08	7.69	69.23	
	5.36	2.44	10.98	
Total	56	41	82	179
	31.28	22.91	45.81	100.00

Frequency Missing = 102

TABLE OF I562 BY I001

I562(IF FACULTY, WHAT IS YOUR RANK:)

I001				
Frequency Percent Row Pct Col Pct	PA-2	PA-4	PA-6f	Total
PROFESSOR	22	7	18	47
	15.17	4.83	12.41	32.41
	46.81	14.89	38.30	
	44.00	22.58	28.12	
ASSOC PROF	18	5	28	51
	12.41	3.45	19.31	35.17
	35.29	9.80	54.90	
	36.00	16.13	43.75	
ASST PROF	6	17	14	37
	4.14	11.72	9.66	25.52
	16.22	45.95	37.84	
	12.00	54.84	21.87	
INSTRUCTOR	1	1	2	4
	0.69	0.69	1.38	2.76
	25.00	25.00	50.00	
	2.00	3.23	3.12	
OTHER	3	1	2	6
	2.07	0.69	1.38	4.14
	50.00	16.67	33.33	
	6.00	3.23	3.12	
Total	50	31	64	145
	34.48	21.38	44.14	100.00

Frequency Missing = 136

TABLE OF I565 BY I001

I565(DO YOU NOW HAVE TENURE?)

I001				
Frequency Percent Row Pct Col Pct	PA-2	PA-4	PA-6f	Total
YES	36	11	47	94
	20.22	6.18	26.40	52.81
	38.30	11.70	50.00	
	69.23	26.19	55.95	
NO	16	31	37	84
	8.99	17.42	20.79	47.19
	19.05	36.90	44.05	
	30.77	73.81	44.05	
Total	52	42	84	178
	29.21	23.60	47.19	100.00

Frequency Missing = 103

Report Distribution List

Addressee	DODAAD Code	Number
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